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REMINERALIZE THE EARTH

Regenerating our soils, forests and health

RECYCLING MINERALS with finely ground gravel and rock dust

ISSUE #1 WINTER 1991 • NORTHERN HEMISPHERE

On Carrying Stones
A Statement of Purpose

It is fire I will carry.
From field to wall.
Fire of a star now frozen into crystal gift.
Laid before the sun and stars,
these stones will know the force
of wind and heat,
water and cold.
Their fire shall yield and change
and break into crumbled dust of soil.
Tomorrow's soil.
I will carry that from field to wall.
I plant them as a row of seeds.
Bless them for the journey
that will continue long after all the living
community of today shall pass away.
Worn and broken,
they shall yield to life itself,
and the hidden, tiny microbes
shall break and feed them to the hairs
of living roots
for the great ascendency into life.
Perhaps they may grow up into wheat,
wheat born of fire,
fine and strong.
Marrow of some future child.
Child of the stony country.
I will carry the bones
of tomorrow's child

Sister Miriam McGillis

SUMMER 1991 • SOUTHERN HEMISPHERE formerly SOIL REMINERALIZATION NEWSLETTER

REMINERALIZE THE EARTH

Regenerating our soils, forests and health

Recycling minerals with finely ground gravel and rock dust

This magazine is a reflection, forum, round table of ideas, experiences and research of those concerned with networking and implementing soil remineralization. Articles, letters, and photos are welcome and appreciated. We reach an emerging grass roots community network around the world.

EDEN OR ICE AGE
Which Will We Choose?

The book *The Survival of Civilization* by John Hamaker and Don Weaver is regarded by a growing movement worldwide as a blueprint for the survival of the Earth, restoring ecological balance and, perhaps, even recreating Eden.

The remineralization of forests, farms, orchards and gardens with glacial gravel and rock dust is nature's way to regenerate and fertilize soils. During an Ice Age, as glaciers grind rock to a fine dust over millennia, a fertile soil is created. Adding finely ground gravel dust to soils is a tremendous boost to organic agriculture and can make it truly viable by adding up to a hundred elements and trace minerals needed by all life and by nourishing the microorganisms in the soil, whose protoplasm is the basis of all living things.

There is evidence to suggest that as forests begin to die off worldwide, giving off carbon dioxide, the climate of the Earth is altered, triggering the transition from the warm interglacial to an Ice Age. We are hastening this process with the burning of fossil fuels. Undertaking the task of remineralization is urgent to restore our agricultural soils and to save the dying forests in the temperate latitudes and stabilize our climate.

On the Cover: Poem by Sister Miriam McGillis of Genesis Farm in New Jersey. Photo by Diane Edington in Cummington, Massachusetts; from "Stone Country."

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Welcome to Remineralize the Earth

About and In This Issue

What's In A Name?

Well, dear readers, you will have immediately noticed some exciting changes taking place. This issue is the first of many to come with our new name, ***Remineralize the Earth***. Thank you for all your contributions to name change possibilities that were considered. And thank you to new co-editor Willow LaMonte for coming up with the name we have chosen! To remineralize the Earth is our goal and is now hereby put into dynamic motion by this magazine and its new title.

New Volunteer Co-editors

Joining me along with Janet Scott as co-editor are new co-editors Willow LaMonte and Marianne Snell both of whom have experience with publications. Marianne Snell currently works with the *Mt. Holyoke College Alumnae Quarterly*- – of which Janet Scott is an alumna.

Willow LaMonte has worked on *Women: a Berkshire Feminist News Journal* and also owned and operated Pennyroyal Printing, and is an organic gardener in the process of remineralizing her garden.

A New Printer

This issue has been printed by Alonzo Printing of South San Francisco. They work almost exclusively with recycled paper using soybean inks and are the printers for the *Earth Island Institute Journal* and *Green Letter–Greener Times* and *Tradeswomen*.

Expanding Our Readership

With this premiere issue I would like to invite you to help expand our readership – which will make this printing more feasible. We now offer bulk quantities of the magazine at very low prices and discounts for your local health food store, book store or other potential distributor for the newsletter. If you are speaking in your local community or attending a conference, and would like to sell ***Remineralize the Earth*** at our bulk rate, please get in touch with us.

Ordering copies would greatly contribute to making the newsletter economically viable (by that is meant covering its own printing and mailing costs) – and is also crucial to getting the message out to more people. When the subscriptions expand, the issues will be available at a cheaper price as the higher quantity cuts down on the cost of printing for each issue. Thank you for supporting us in achieving that goal. To effect change, to remineralize the earth, we need to reach many people – from the grassroots to the policy makers, and everyone in between.

New co-editor Marianne Snell at her desk

A New Format

We have divided the Table of Contents into active "how to" remineralize articles and to those which involve active networking of soil remineralization and climate issues.

Special Features

Our special features include an excellent article by David Yarrow on the remineralized farm of Tom McDonald in upstate New York – graciously given permission to reprint by *Solstice* magazine.

A Technique called N-Viro, by Tad Montgomery, informs readers about an exciting new technology already actively employed in many cities and communities – transforming city sewage sludge into a remineralized soil product, using cement kiln dust. The possibilities for N-Viro and remineralization together are many – from creating an enhanced version of an "organic Miracle-Gro"– to an inexpensive way to remineralize large tracts of forest for forest regeneration and reforestation. It's a joy to speculate on such possibilities.

Another exciting possibility for readers to participate in is *Shaping Your Own Experiments* for remineralization in conjunction with the ongoing research project of Stephanie Sable Bierman.

I hope this issue will inspire many more projects, much more networking and "down to earth" remineralization of gardens, orchard, farms and forests.

We sadly bring the news of the passing of Larry Ephron, whose contributions to the issue of remineralization and climate have been very substantial and will be greatly missed, as he will also be greatly missed by family and friends.

Thank you readers, for all your contributions to this magazine, which is a reflection of the diverse community that we are – encompassing countries on almost every continent of people coming together to remineralize our Earth. May the new year bring remineralization to many more people and places everywhere.

Joanna Campe

In Next Issue:

- "Keyline Agriculture and Soil Remineralization" with Dan Hemenway
- Part 2 of "A Call To Action" with the Woods
- "Hamaker Coordination Update"
- "Rock Dust and Dowsing" with Harvey C. Lisle

If you are interested in advertising to the remineralization community inquire about our ad rates.

Dateline: 12/28/90 Central California Frozen Groves and Fields

by Don Weaver

"Whatever Happened To Global Warming?" is today's column by Jon Carroll in the *San Francisco Chronicle* after the past week of "all time" record cold temperatures, resulting in a thorough devastation of a major California and U.S. crop – navel oranges – with lesser but significant damage to avocados, other citrus, a variety of vegetables, flowers, ornamentals and cold-sensitive trees.

Other effects included thousands of bursting frozen pipes, many millions gallons of water lost as the fifth year of California's drought moves on into 1991, a major burst of wood and fossil fuel burning to compensate for the cold, and a few more deaths among the growing number of shelterless people across the state, country and world.

The cold waves are working toward southern Arizona, Texas, and Florida, too, as should be expected with reports of record rains, cold and blizzards.

News has been trickling in from Eurasia also the last few months. A very wet and cold August and September... in the U.S.S.R. apparently did major damage to the potato harvest and it would seem, much more damage was done based on later weather reports and stories of food shortages and rationing in Leningrad and other cities.

Perhaps now Jon Carroll will be inspired to read or re-read the copy of *The Survival of Civilization* sent him a few years ago. Perhaps many of the millions who've been given the oportunity to consider the Hamaker thesis will more clearly see the "writing on the wall" and take the positive steps Nature requires of us.

Will the future climate "programmers" respond to the growing severity of pre-glacial weather extremes with some new thinking and "real world" focus? Or will they remain unwilling to disengage from their "doubled CO^2" computer models and their beloved but ill-conceived child, "Global Warming", regardless of mere facts to the contrary?...

Facts such as 1º F in San Jose and Santa Cruz, 18º F in Fresno, 14º F in Orland (Sacramento Valley navel orange region), 14º F here in Burlingame, 11º F in Sebastopol,) 5º F in Point Reyes, (a little north of San Francisco), 0º F or less in upper parts of northern California.

One final interesting fact for now: the remineralized lemon tree here has stayed dark green and healthy looking whereas the Orland citrus trees shown on TV had severely curled and damaged leaves. Could the minimum $500 million, lost by orange growers be better spent on "prevention"?!

"The Middle East crisis intensifies the need for solar and thermal electric technology development and other alternatives to replace the use of fossil fuels. At the same time, it demonstrates the urgency for all countries to be involved in a total climate stabilization era...

War is the worst ecological disaster imaginable. The position of President Bush regarding the middle East and the military buildup at this time in the face of the earth's rapidly worsening ecological conditions we consider to be extremely misdirected. It is a crime against the American people and the rest of the world with indescribable consequences. Survival means no war. Survival means a maximum international effort to reduce CO2 from the current 354 ppm in the world's atmosphere back to around 280 ppm during the next fifteen years to continue sustainable life and attempt to avoid the accelerating intensities of climate change which threaten agricultural production in the temperate zones of the world, as well as our technological way of life. The next 15 years will be critical in the effort to stabilize our climate."

by Alden Bryant
Earth Regeneration Society
in a recent letter to the United Nations

*See a report on their recent activities page 30 and see **Resources** on page 55 for more information on their activities.*

One trusts that ***Remineralize the Earth*** readers are already conscious of the global implications of this, as well as with the billions of dollars spent to prepare for war to protect ecologically obsolete energy systems. (To the "humanitarian" argument, the question was raised: would the U.S. be building up the "Desert Shield" if Kuwait's main export were broccoli?)

Let us express and build peace and health from the ground up – from "soil to Psyche" – with the awareness that ecological thinking and reverence for life are the keys to a regenerated humanity and Earth. But please don't take my word for it – question and see it for yourself.

A Brief Perspective On Soil Remineralization And The Climate

Soil Remineralization

The soils of the entire world have become severely demineralized by erosion over thousands of years. Plants require a continuous intake of minerals, just as we do, and for very similar reasons – calcium to build structural support, iron to carry oxygen, and so on. Plants growing on mineral-depleted soil do not get enough nourishment and so become smaller, less-abundant and less hardy, more vulnerable to the insects, worms and fungi they are prey to.

Remineralization causes a phenomenal growth of the microorganisms in the soil. It increases the nutrient intake of plants. It counters the effects of soil acidity, prevents soil erosion (just for that reason it would be worth applying rock dust), increases the storage capacity of the soil, contributes to the building of precious humus complexes, has anti-fungal properties, and when you spray it on plants it repels insects as well. The plants and trees become highly resistant to insects, disease, frosts, and drought. Remineralization also enhances and speeds up the process of composting, so if you're composting for your garden, consider putting on some rock dust. It can be even more effective than just directly applying it to the land.

For Forests

The results of long term experiments released in 1986 showed that *in a forest where pine seedlings were remineralized, after 24 years the wood volume was four times higher* than in the untreated area.

For Agriculture

The best source of soil minerals is simple crushed gravel dust. In 1976 John Hamaker spread gravel crusher screenings on part of his ten acres in Michigan. The following year, in an area of sparse rainfall and dry summers, *and with no irrigation,* his corn produced 65 bushels per acre, compared to yields of under 25 from other local farms.

Moreover, when independent analyses were done, Hamaker's corn was found to contain 28% more protein, 47% more calcium, 57% more phosphorous, 60% more magnesium and 90% more potassium than the same type of corn grown with chemical fertilizers nearby.

Twenty years ago the USDA published studies which showed that cement kiln dust (a less-satisfactory source of minerals) also produced better crops, but they couldn't understand "what element" in the dust was responsible and dropped the matter.

Don Weaver grew 18-foot pole beans on remineralized soil (Jack and the Beanstalk?) and got *two to four times the normal organically grown yield.* Alan LePage of Vermont grew a crop of carrots averaging 1-1/2 feet long. And there was no insect damage to any of these crops.

Hamaker estimates that on fully remineralized soil, American agriculture could grow *four times* as much food as it is capable of now – or the same amount of food at about one-fourth the cost – and with no pesticides or chemical fertilizers.

The Nutritional Aspect

When we eat food grown on depleted soil we too, like the plants, lose our natural resistance to disease. All the degenerative diseases have been on the rise in America in recent decades. Dietary fat, cholesterol, salt and overly-refined foods seem to be major factors, but a serious deficiency of minerals in our food may be another. Mineral depletion of soils has been found to be directly correlated with death rates. And deficiencies of only one of a number of trace minerals-- copper, iron, selenium, etc. -- have been found in laboratory studies to be associated with an increased risk of cancer. You may want to grow more complete, nourishing food for yourself and your family.

A Global Perspective On Climate

The problem of soil demineralization also has a global perspective. It is known that the Earth's soil becomes demineralized during each interglacial period, the relatively short 10,000- year warm period between each 90,000-year major Ice Age. Consequent decline and death of the world's forests and other vegetation which occurs causes great quantities of carbon dioxide to be given off. The level of carbon dioxide in the Earth's atmosphere has been rising exponentially for the past century. Carbon dioxide and other greenhouse gases trap excess heat from the sun, potentially affecting the world's climate.

It is also well-known that when the glaciers advance and then recede during each recurrent Ice Age, they grind down rocks in their path, and that their mineral-rich dust is blown far and wide over the surface of earth, remineralizing its soil and causing plant life to thrive again.

John Hamaker has supplied one missing piece of a cosmic puzzle to provide an explanation, long sought, of the awesome 100,000-year cycle of major Ice Ages. Hamaker points out that the greenhouse effect occurs primarily in the tropics, which get the most sun, rather than in the polar regions which get very little. When this happens, the temperature differential between the tropics and the poles increases, resulting in fierce wind systems, hurricanes, tornadoes and storms.

The moisture picked up by these increasing storm systems also is transported to the higher latitudes, where it gets deposited as snow and ice, eventually bringing on glaciation and the next Ice Age. This has been happening in recent years, with record snow cover in the Northern Hemisphere and a shortening of the growing season, by weeks in some places, a pattern which is also accelerating year by year. Hamaker estimates that within a few decades the growing season may have decreased so much that millions of people will starve, in the richer nations as well as the poorer.

The above information is condensed from the writings of John Hamaker, Don Weaver, Larry Ephron and Joanna Campe.

A Rock Dust Primer

What type of rock is best?

Feeding poor soil with mixed rock dust may be compared to feeding an ill person a varied diet of unrefined, natural food. If no one single food is a panacea, it might follow that no single rock type is "ideal". Indeed, the virtue of glacial gravel is said to lie in its broad spectrum of rock types. Hamaker advocates the use of glacial gravel dust, ideally followed by river and seashore gravels and mixtures of single rock types.

John Hamaker suggests finely ground glacial gravel because that is nature's way throughout millenia to create fertile soils. Glacial gravel, which is a natural mixture of rocks, will create a broad spectrum of minerals in the soil in a natural balance.

Much of value can be gleaned from Europe and the research and experiences there (where single rock types and combinations of single rock types are used.) Hamaker's approach, however, may very well offer an even greater potential for an ecologically sustainable and sound agriculture and forestry.

Does it need to be a special kind of gravel?

Again, the analogy of feeding soils to feeding humans in pertinent. From simplistic notions of human dietary requirements as straight protein-fat-carbohydrate ratios, our understanding of specific human dietary needs has grown to staggering sophistication and complexity, and we are now learning that what we don't know may exceed what we do. Similarly, we have come a long way from the simple NPK idea. But no amount of controlled research has conclusively told us (or likely will ever tell us) precisely which minerals specific plants really need and in what precise proportion. The attempt to second-guess nature in all her complexity is sure to be a futile and perpetual game of catch-up.

The above information is condensed from the writings of John Hamaker, Don Weaver, Larry Ephron , Joanna Campe and Solstice magazine.

Approximate Application Rate Conversions

3 tons per acre	=	0.5 lb. per 100 sq ft.	=	1.5 lb. per sq yard
10 tons per acre	=	1 lb. per 100 sq ft.	=	4.5 lb. per sq yard
20 tons per acre	=	15 lb. per sq ft.	=	9 lb. per sq yard

Hamaker asserts that:

"microorganisms select what they need to make the compounds of life, and reject to the subsoil what is not needed, [such as] aluminum, silicon, iron, etc., which are generally in excess [in gravel dust]," further pointing to "the Kervran research on biological transmutations", which suggests that biological organisms may play an active role not only in selecting specific elements, but also in modulating their elemental nature to create needed materials where they are in short supply.

Says Hamaker,

"As long as the soil is neutral [in pH] or close to it, microorganisms will control what goes into the plant roots. These controls are off when the soil is acid or acidic chemicals are added."

The Soil

Compost. A very sensible use of glacial gravel dust is in conjunction with compost - recycling of organic matter as well as minerals - and other methods of organic farming. Compost and gravel dust are a symbiotic combination: the compost provides an excellent medium for the "microorganism population explosion" promoted by the dust, and the gravel dust will not only help create more organic matter, but will also help hold it in place and conserve it.

Acidity. Soil pH should be measured annually. If the soil is acidic, agricultural limestone may be added together with the rock dust to bring the soil pH to neutral.

How To Apply Gravel Dust

There are many ways to apply dust to the soil; which method you use depends on the scale and your preference. It can be spread by hand out of a wheelbarrow, by using a manure spreader, sprayed with a mechanical sprayer (use a fine mask to avoid inhaling it in this case). An excellent approach mentioned earlier is to first combine your gravel dust with compost, then apply both together.

How Much to Use

Hamaker says,

"A grower of crops or a gardener needs a good response the first year after a fall application. The response in any one year depends on the amount of minerals available to the microorganisms, soil moisture and the amount of inert organic matter."

"If the last two factors are satisfactory, as little as 3 tons of gravel dust per acre worked into the top 4 inches of soil should give good results. However, I prefer about 10 tons per acre worked in about 8 inches, since one application will eliminate the cost of a number of more frequent applications and give high yields."

The Application Conversion chart above will help you to determine how much gravel dust to use: 3 tons per acre is considered the minimum application, 10 tons per acre is Hamaker's preferred long-term application, and 20 tons per acre is given as a major remedial application, as for especially dry, poor soil. Smaller amounts may be recommended if the rock dust is 400 mesh or finer.

Purchasing Gravel Dust

Gravel grinding operations are common throughout the country. Call your local gravel pit (look in the *Yellow Pages* under Cement-Wholesale, or Sand and Gravel) and ask if they have crushed gravel screenings made from mixed rocks, the kind that comes out of river beds– crushed and passed through a 1/4 inch or finer screen. The gravel dust will probably cost from $1–$8.00 per ton plus the cost of transportation if the gravel pit delivers it to your garden. As most of the cost is in transporting the rock dust, having a truck or access to one is an advantage. A cooperative initiative would also cut costs down.

Particle Size Conversion

Particle	Diameter (microns)	"Mesh"
Fine sand	250 – 100	50 – 125
Very fine sand	100 – 50	125 – 250
Silt	50 – 2	250 – 6000
Clay	2 or less	6000 or more

The Particle Conversion Chart shows various categories of "soil separates" (ground particles) listed with their diameters in microns (thousandths of a millimeter) and their corresponding screen mesh sizes. "Mesh" simply refers to a screen with a given number of holes per inch.

The more finely ground the rock, the more readily will microorganisms have access to the minerals. John Hamaker uses the term "gravel dust" to mean a dust "90% of which will pass through a 200 mesh screen", i.e., 60 microns or smaller.

Testing Your Gravel Dust

"Several people have reported to me that gravel dust does not work or it will have [only] a temporary effect. The don't describe the dust in detail, but I suspect they had very little dust in what they call 'dust'. Know what you are buying or you may be badly disappointed." - John Hamaker

Here are three simple, quick tests you can perform at home:

Pot Test. A pot test will give you immediate, practical proof of what the product will do in the soil. It is a good idea to add the gravel dust to clay pots and plant radishes or other fast growing plants and observe their progress. As John Hamaker writes,

"Doing a pot test is the most convincing argument I know of. Anybody can do it. There are testing laboratory grinders everywhere. There is no lag time. In 6 hours you can get a microorganism population explosion. Taking some 6" clay pots, I filled them with a 50-50 mixture of earth and peat and 3 heaped tablespoons of dust. The results were astonishing!"

You can compare different mixtures or samples of gravel dust depending on what's available in your area. Use a control without rock dust to compare as well. You can also begin with small plots in the garden. You can see the results of the gravel dust you've chosen and then add it in larger quantities to your garden. Work the gravel dust into the topsoil, if possible. By the way, very fine dust sprayed directly on plants and trees has been shown in research in Germany to keep insects away very effectively.

Separate Layer Test. Purchasing a product based on its stated screen mesh alone still leaves room for error. A purchase of 90% or even 100% 200 mesh screenings could contain only sand and silt, and no true dust. A separate layer test will tell you approximately how much of your "dust" is really dust and will be suspended in water.

Fill a clear glass container about half full of [gravel] dust and cover it with about 2 inches of water. Shake it vigorously and let it settle overnight. You can get fairly accurate percentages.

If the container is allowed to stand until the water has dried out, the dust [topmost] layer will shrink to about 1/3 the original measurement and give a more accurate percentage of the dust. Your first observation, however, will tell you if you are buying mostly sand. The coarser the grind, the less effective it will be in the soil, and the more you will need to use per acre.

Moisture Test. *"If the material is bought by the yard, there is a probable increase in bulk when wet...The buyer needs to test so one can know the actual weight of dust one is applying to the land."*

Take a sample, weigh it, then dry it thoroughly in the oven [and re-weigh it]. This will tell you how much of the weight you are buying is moisture.

Chemical Analysis

In most situations, having a formal chemical analysis made is probably going to unnecessary trouble. A pot test and small-scale trials with fast-growing plants will give you more accurate information and with less expense. In cases where you have doubt about its source, you may wish to have a gravel dust analyzed to ensure that it is free of radioactive elements and toxic industrial by-products. In most cases your source will have already had to undergo such testing in order to get a license to operate. This is worth some homework. If you are not able to obtain documentation to your satisfaction, it might be wise to go ahead and obtain your own independent lab tests. A good testing lab is listed in the *International Gravel Sources* section on pages 42-43.

More Tips From Hamaker

◆ *One other thing might be useful. I put about 2 inches of sand on our garden before plowing. It will last a long time and give some yield after the dust is used up. I am sure it has been contributing to what we grow. Unscreened sand (preferably fine sand) from a local gravel pit is much more economical than shipping dust which is mostly silt and fine sand."*

◆ *Sometimes the gravel pits have mesh screens and can measure the exact fineness of the gravel. Though it may be hard to find the ideal fineness– 90% passing through a 200 mesh screen– it may be practical to use even if only 20% or so passes through a 200 mesh screen and at least 50% passes through a 100 mesh screen. You will have the finer material immediately available to the soil and the rest will break down over time. If most of it passes through a 200 mesh screen, it will have a fine consistency like flour or cement. The gravel pit may have machinery to crush the rock finer and may crush it for you.*

◆ *Combining g ravel dust with organic materials in compost is a great way to solve application problems and speed up the process. Don't forget a handful of soil to innoculate with organisms. Gravel dust improves aeration and structure and therefore prevents rotting. Gravel dust is assimilated even more quickly in compost than in poor soils.*

Soil erosion is an effect of the shortage of minerals available to support the soil organisms. As Hamaker says,

◆ *"That shortage can be made up on any piece of land in the time it takes to work ground gravel dust into the topsoil. When that is done, the soil microorganisms begin to multiply and it is they who prevent soil erosion by granulating the soil and holding it against both wind and rain."*

We would like to know what results you get from remineralized soil, so that we can improve our knowledge and data-base. Please call or write us. Photos with written reports are welcome and an important contribution to our network.

In Memoriam

Larry Ephron 1936-1990

We are sad to report the passing of our co-worker and friend Larry Ephron, November 16 in Kensington, California. He was a frequent and valued contributor to the Newsletter, and his gifts will be greatly missed.

As a psychologist and environmentalist (PhD, Harvard), Larry was a tireless worker for regeneration of the planet and betterment of the human condition. He was the founder of Berkeley's **People for a Future**, a nonprofit corporation which provides support for environmental and health concerns, and of San Francisco's **Sierra Clinic**, which helps people with worker's compensation and job-related problems.

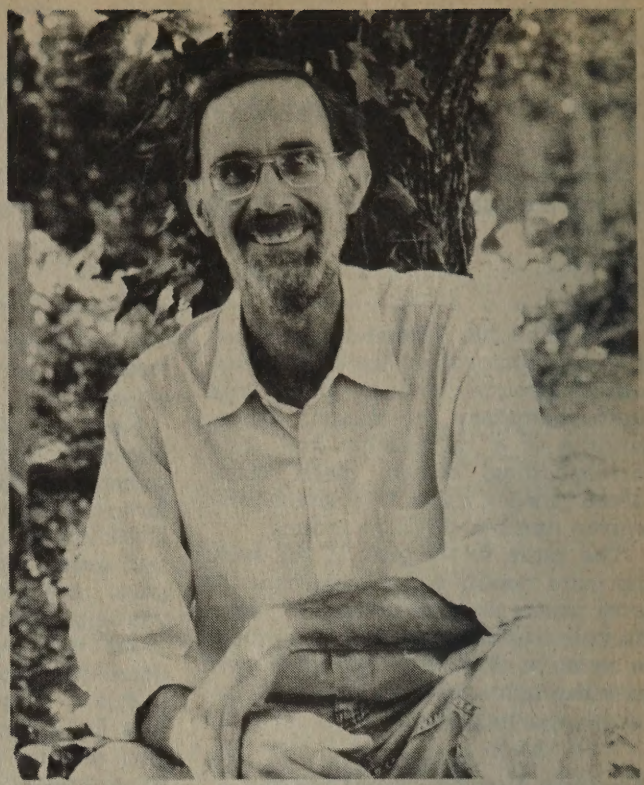
Larry's book ***The End***, and his video film, ***Stopping the Coming Ice Age***, generated much interest and support for the Hamaker thesis that there is a global Ice Age every 100,000 years and that the only way to stop the next, imminent one is through massive reforestation and remineralization of the world's soil.

At the time of his death Larry was working to complete two new books which were to be published in December.

A New Earth: How We Can Quickly Heal the Planet, End the Greenhouse Effect, and Save Our Lives, a revision of ***The End***, expands on the theme of remineralization for planetary regeneration. The second, ***The Miraculous Diet***, the labor of 15 years, is based on the work of Dr. Max Gerson, who developed a treatment for cancer using organically grown vegetable and fruit juices.

The San Francisco Chronicle obituary notice says of Larry Ephron, "...a visionary healer, artist, musician, film maker, environmentalist, radical; was always years ahead of his time..." His love of Life and Nature and his contribution to healing the Earth will be remembered by all who carry on the work to which he dedicated himself with such passion.

Janet Scott



A recent photo of Larry Ephron in his remineralized garden. (photo by Don Weaver taken this autumn.)

A Note from Don Weaver

On November 16, I was sad to learn that co-worker and friend Larry Ephron had suddenly departed this world, while sleeping, apparently, during the night.

It was clear from the very healing memorial service held on Nov. 18 that Larry's love of Life-and-Nature and his dedication to Earth Regeneration are missed by family, friends and co-workers alike. Thanks for all your contributions, Larry. It seems you advanced "the cause" immeasurably.

For Life and Regeneration,

Don Weaver
November 28, 1990

Farewell, Larry Ephron. And thank you for all your efforts to bring the message of remineralization and climate change to the public, that is, to every one of us. As far as "carrying stones", you carried many a stone for tomorrow's soil and tomorrow's child. And we are grateful.

Joanna Campe, Editor
Remineralize the Earth

The Need For Soil Remineralization

This cover letter for a new mailing of literature and video to Congress is a good summary of the need for soil remineralization:

Dear Senator / Representative:

While it is primarily about the climate crisis, the enclosed material simultaneously solves many other global problems – in agriculture, world hunger, environmental pollution, and health.

(1) Research in several countries shows that finely ground mixed rock dust restores the original fertility of agricultural soils, comparable to natural processes of soil building such as the weathering of mountains and glaciation. Plants grown on such remineralized soil grow up to 200-300% faster, producing similar astonishing increases in yield.

(2) Crops grown on remineralized soil need no environment-polluting chemical fertilizers or toxic pesticides whatever. The plants are so strong they resist most insects and disease on their own. We can look forward soon to the day when the world's rivers, land, and wildlife are free of agricultural poisons.

(3) Food crops grown on such remineralized soil contain many more nutrients than chemically grown food. Such super-nutritious food, free of all chemicals, should substantially reduce the alarming prevalence of degenerative illnesses in modern societies, and help reduce our astronomically rising health care costs.

(4) Crops grown on remineralized soils are much hardier than chemically grown crops, and more likely to survive climatic extremes such as cold, heat, and drought.

(5) The greatly increased yields of remineralized crops, combined with their substantially greater resistance to climate extremes, will enable us not only to finally end world hunger and starvation, but to greatly increase the world's dwindling food reserves and shore up everyone's food security – while we do everything in our power to reverse the greenhouse effect and bring the climate under control.

I hope you and your staff will study this material very carefully. Our lives may well be hanging in the balance.

Thank you very much,

Larry Ephron, PhD

Stabilizing The Climate What Will It Take?

How long will it take us to bring the atmospheric CO2 from its current 355 parts per million back to a safe level of 270 ppm?

1 ppm atmospheric CO2 = 2.13 Gt carbon (Gt = gigaton = 1 billion tons)
355 - 270 = 85 ppm x 2.13 = 181 Gt carbon we have to remove.

Reducing Fossil Fuel Burning

This would not remove carbon from the atmosphere, but only slow the rate at which it continues to increase. With great motivation we could reduce fossil fuel burning 50% within 5 years, which would slow the increase by 2.5 Gt carbon/year. As it is phased in, however, it would reduce the increase by an average of only 1.25 Gt carbon/year.

Stopping Deforestation

This would not remove carbon either, only slow its increase. George Woodwell of the Woods Hole Research Center in Massachusetts estimates that stopping deforestation would reduce the increase by 1 to 4 Gt of carbon per year. We can conservatively estimate the benefits of stopping deforestation at about 2.5 Gt of carbon/year.

Reforestation

This would remove carbon from the atmosphere, by storing it in the tissue of new trees. Roger Sedjo, a forestry expert at Resources for the Future, has estimated that planting fast-growing trees worldwide on an area the size of the United States would remove the equivalent of all the CO^2 currently being produced by both fossil fuel burning and deforestation, or about 7.5 Gt of carbon/year.

Remineralizing Forests

Research shows that remineralizing forest soils with finely ground mixed rock dust is likely on average to double the trees' growth rate and consumption of atmospheric carbon.

Remineralizing *newly-planted* forests of fast-growing trees is likely to remove an additional 7.5 Gt of carbon/year from the atmosphere.

Existing forests currently process about 100 Gt of carbon/year. By increasing their growth rate, remineralizing only one-fourth of existing forests is likely to remove at least an additional 25 Gt of carbon/year.

Remineralizing Phytoplankton

John Martin of Moss Landing Marine Laboratories identifies ocean areas where upwelling provides an abundance of nutrients and the growth of phytoplankton is limited by a scarcity of iron (and perhaps other minerals). He estimates that remineralizing these areas (only 18% of the global ocean) with finely ground iron ore would rapidly increase phytoplankton growth and thus remove about 4 Gt of carbon/year.

The total of all these means of removing carbon from the atmosphere is 44 Gt of carbon/year. That means we could remove the 181 Gt of excess carbon within only 4.1 years– but if we do not accomplish the difficult jobs of halving fossil fuel burning and stopping deforestation, atmospheric carbon would still be increasing during those 4.1 years by 7.5 Gt/year, or another 30.7 Gt. So we would not catch up and remove all the excess carbon in less than five years. *Reforestation and remineralization are relatively easy and painless. But if we hesitate now, our greatest efforts may soon be too late.*

Larry Ephron

Greg Watson
Appointed The New Commissioner For Food And Agriculture In Massachusetts

by Joanna Campe

Photo right: New Mass. Comm. of Food and Ag. Greg Watson speaking with Joanna Campe at New Alchemy in East Falmouth, Mass. (1989)

A long time soil remineralization enthusiast, Greg Watson has recently become the Commissioner of Food and Agriculture for Massachusetts.

Greg was formerly Director of Science and Technology for Mass., Assistant to Ag. Commissioner August Schumacher and also filled a position at the Office of Economics. He was recently the Director of New Alchemy Institute, a research center on Cape Cod, working to develop sustainable farming techniques. He has played a large role in the implementation of Integrated Pest Management (IPM) as a policy leading to a large scale reduction of pesticide use in the state.

He hopes to remain in office when the new Weld Administration takes office, to push through some legislative changes. "I've met with the folks from the transition (of Governor-elect William Weld) and I'm being cautiously optimistic", says Greg who is counting on farmers to lobby on his behalf."

In the past Greg and I have had an opportunity to work together. We gave a workshop on Remineralization at a NOFA (National Organic Farmers Association) conference a few years ago and last January, 1990, we spoke at the state gathering of the Mass. Maple Growers Assoc. encouraging remineralization to regenerate dying maple trees. (See ***SR*** no. 17.)

He has written papers advocating remineralization and the need to stabilize climate for several conferences, including one at the United Nations with the Earth Regeneration Society.

I especially love Greg's description of an Ice Age as Gaia's strategy for regenerating and replenishing the Earth's soils.

In the Spring 1988 issue of ***SR*** in his article called *A Global Remineralization Program, With a Bioregional Approach,* he spoke about the possibility of global synergy through international cooperation and addressed such questions as, "What right do we have to intervene in the climate process?" In the article he wrote:

◆*We have the opportunity to implement a plan that will asist Gaia in the rebuilding of its soils and reforesting its lands. If we accept this responsibility we may avoid the only other Gaian alternative for getting this job done, i.e., via the destructive route of glaciation. What is needed now is a coordinated global remineralization program.*

◆ *Hamaker's thesis merely points out that like the organic materials that make up soil, its mineral content must also be recycled. It just so happens that nature's methods for recycling inorganics requires tremendous amounts of mechanical energy. So the choice is either tectonics and glaciation or human technology.*

◆ *Humans will discover the... benefits that result from conscious cooperation. It would be impossible,... for nations to mount a massive global remineralization program and support huge military budgets at the same time.*

◆ *(Buckminster) Fuller was convinced, as I am, that Nature endowed the human species with a powerful mind so that we would eventually realize that* **conscious cooperation** *is the key to continued human survival and to accelerated planetary evolution. Cooperation is the only thing that will prevent humans from sharing a similar fate with the 90 percent of the species that once inhabited this planet and have since gone the way of extinction.*

If we do what must be done to restore the soils and stave off the next glaciation, humans will find themselves engaged in an unprecedented display of global unity and cooperation. And we will be transformed in the process, for we will have engineered our own evolutionary quantum leap.

Greg also wrote an article on *Government Responsability in Addressing Climate Instability* and on the theme of climate as a human rights issue. He gave the address at the Earth Regeneration and the Environment Seminar at the U. N. December 9, 1988.

After describing the disastrous weather and earthquake occurrences that took place that year, he described it as a human rights issue.

◆ *Clearly, human suffering resulting from weather-related events attained staggering proportions this past year. Because there is significant evidence supporting the view that human activity played a significant role—directly and indirectly—in creating the atmospheric conditions that triggered much of the violent weather. . . and because there is equally strong evidence which suggests that collectively, humanity possesses the knowledge and technologies to mitigate these conditions, I consider the problem of climate change to be critical to those concerned with human rights.*

In fact, if some of the scenarios describing the near and long-term consequences of the Earth's changing climate are correct, I would offer the opinion that this may be the ultimate human rights issue facing us today.

◆ *Finally, we have to make every effort to explore the total inventory of possible solutions, and encourage international cooperation in implementing those leading to climate stability and a sustainable future. Above all, we must not let politics prevent viable solutions from being implemented.*

Congratulations, Greg on your new position as a policy maker. We wish you much success!

The Snowballing Plea to Save the World Environment

Betsan Coats
"Snowball"
Earth Repair Action
P.O. Box 200
Cotton Tree, Queensland
Australia 4558

An update on the growing movement from Betsan Coats in Australia

The Snowballing Plea cassette and literature have been snowballing consistently and it is surprising the places from which we have had appreciation and enquiries. It has also been quoted, and formed the basis for articles in various magazines, which has also led to feedback from remote places.

We have had no adverse criticism except for an occasional protest about Charles Peaty's use of a herbicide which he describes in his talk on Side B, giving his very successful techniques (92% survival) for planting in arid or desert land with 250 mm rainfall or less. On receipt of these criticisms we have written giving Charles' explanation that the use of herbicide is necessary to prevent the baby trees having to compete with coarse desert grass, and because the one he advises also provides nutrients. We have also emphasized that he is responsible for the planting of over 60 million trees; large numbers having been planted in Kuwait, Pakistan and Western Australia in near desert conditions.

We have had quite a large number of Questionnaires returned, giving details of the individual's or group's activities, and we have also had a great many letters telling us how the writer has copied and Snowballed the cassette and its papers. Many of these letters ask for further particulars concerning the remineralization of the soil with fine ground rock used as a fertilizer, now termed "agrogeology", which is discussed by Barry Slogrove and myself on Side B. In reply to these letters we have sent out a packet of information from people in many parts of the world.

Recently the *Snowballing Plea* has been the subject of Dr. Keith Suter's radio programme in Perth. At one time, over a number of years, he was the president of the United Nations Association of Australia. I have been told that the *Plea* has been quoted on programmes in the United States, but have no specific information as to which.

Of the thousand cassettes with which we started the project, we now have 60 left. We have quite a lot of printed papers that accompanied the cassettes left over because of ordering extra copies at the low rate that a hundred or so cost at the initial printing. Because of this, we are sending a letter to selected people offering a master cassette they could use for copying, and the relevant papers to accompany the copies of the cassette they may undertake to Snowball both privately or for conferences.

This was carried out in January, 1989 for the convention of the Theosophical Society at the University of Sydney. From a master cassette, the Society made some 50 copies which were sold at the convention - the Society kindly donating the profit to us at the suggestion of Dianne Kynaston, the General Secretary.

Since we received the inspiring messages from His Holiness The Dalai Lama and from Dr. Robert Muller, Chancellor of the University of Peace, Costa Rica, and formerly the Second Secretary General of the United Nations, we have included these in our Snowball packet. *The Snowballing Plea* has been translated into Hungarian by Laslo Reicher, and is now being circulated in script form from Budapest. At present, very few people have recording facilities there, but as a script we are told it is received and passed on with enthusiasm. In Krakov, Poland, Elsbieta Guta is translating the *Plea* into Polish, where it will also be used in script form. Ludmilla Doneman is also planning to form a group disseminating it in Czechoslovakia. We hope before long to have a Russian translation.

In these cases we are offering initial financial assistance to provide a number of the photocopied or printed scripts so as to get it started. We are leaving all other aspects of distribution to the groups they are forming in each country for that purpose.

Señora Maria Rosa de Garcia in San Rafael, Argentina, has translated the Plea into Spanish, and we are now corresponding as to how best to launch it in Spanish-speaking South American countries, both in script and cassette form. This translation will also be useful in Spain, the Phillipines and in Central America. We hope before long to have a Portuguese translation. The new young president of Brazil is closing airstrips in the Amazon forests to curtail developers' activities; this bodes well for the new government's attitude which will be a great encouragement to the many Brazilian groups anxious about the threat to the forests, and who would probably be glad to make use of the *Plea*.

Although these arrangements in different countries and languages take time, still it is very encouraging that people are enthusiastic about this message and so it is percolating.

However, one project may be much faster! From Costa Rica we were given the name of Dr. Franklin Chang, who is Costa Rican, and the only Latin American astronaut working with NASA. We were told he is a deeply concerned environmentalist due to the Earth's destruction he has seen from Space. We were asked to send him all our data, both that of the *Plea* and of agrogeology, with the least possible delay. This was done immediately and it may be that we will hear of an exciting response from Space.

We plan to continue sending out the *Plea* when it seems appropriate and are preparing a short worldwide summary of the great development in agrogeology, as more and more people are experiencing the wonderful regeneration that rock dust of different mixes causes in the soil. We intend to carry on a selective networking, giving in precise form the results obtained which will be an important contribution in the swing to organic growing, which is at last happening globally.

Through all this time, thanks are due to so many people who have cooperated with the *Snowballing* project.

Firstly, to those who have made it possible financially, which set the Snowball rolling, then to the printers and photocopiers who reduced their prices to assist the cause - to the many people who have carried on

continued on page 41

Don Weaver Update

- **A Glimpse of the Remineralized Gardens of Bestselling Authors Marilyn and Harvey Diamond**
- **A Look at the Gardens of Don Weaver and Larry Ephron**
- **Larry Ephron's Book *The End* Being Revised As *A New Earth***

by Don Weaver

It seems that quite a few readers missed the #10 issue of ***Solar Age or Ice Age? Bulletin*** with its 72 page *More on Soil Remineralization* section.

You may not be aware of the update summary of my cooperative SR project with Marilyn and Harvey Diamond. It will help introduce the photos I took in June '90, which, while they may not reproduce ideally, may yet be worth "a thousand words," as most photos of remineralized vegetation tend to be. From bottom of p. 141 of the *Bulletin*:

"Late update (9/27/89) on results with soil remineralization from Marilyn and Harvey Diamond in Southern California, whose work as Natural Hygiene-oriented educators and authors (best-selling *Fit for Life, Fit for Life II, Living Health)* naturally extends into the nourishing of planetary health through SR, tree planting, gardening and sharing their knowledge of Earth Regeneration principles. As noted on p. 37 of Bulletin # 9, I helped them work in 9 tons of glacial gravel dust in Spring '87. Space permits a short summary of Marilyn's exuberant telephone report:

Everything growing "spectacularly". Fruit trees planted in Oct. '88 already bending down branches, "dripping with fruit" - amazed at growth and rapid, abundant fruiting. Rose bushes now more than doubled height, up to 9' tall. Astonishing tree growth up to 10'/year. Prolific tree seeding resulting in "seedlings and trees everywhere!" "You really should come down and see it, and bring your camera.'"

Well, as mentioned, I finally was able to make a short visit to the Diamonds' home on 4 acres in Calabasas (in dry, mountainous country about 10 miles east of Malibu) in early June of this year, and took a roll of late afternoon photos, that may show best something of what Marilyn had accurately described, even though fruits were still small and we were just in Spring growth.

Having seen many fine examples of the results of SR, I tend to be "hard to impress," but when I must look *up* from my 6'6" vantage point to see the dozens of intensely colorful blooms on rose bushes (trees?) and see the small plum tree I planted more than double my height in less than 2 years...and on a larger scale see a dry wasteland so rapidly become a Garden-Orchard-Forest Paradise -- once again I'm deeply impressed by Nature's ever-ready powers of regeneration and fertile abundance. "Why fight it?" remains a central question of greatest urgency for our imagined-to-be "high and mighty" species riding a Gaiasphere in critical condition.

Paradise Found at the Diamonds' garden-- simple as cultivating givingness toward soil microorganisms, our Earth, and all.

Don Weaver is co-author with John Hamaker of ***The Survival of Civilization*** *and publishes* ***The Solar or Ice Age? Bulletin.*** *The #10 Bulletin is still available. Suggested minimum donation is $10.00. See page 55 for address.*

6'6" tall Don Weaver with 15-ft. plum tree

... I tend to be "hard to impress," but when I must look up from my 6'6" vantage point to see the dozens of intensely colorful blooms on rose bushes (trees?) and see the small plum tree I planted more than double my height in less than 2 years...and on a larger scale see a dry waste-land so rapidly become a Garden-Orchard-Forest Paradise -- once again I'm deeply impressed by Nature's ever-ready powers of regeneration and fertile abundance.

My small Burlingame garden has been bursting with a variety of mineralized greens, tomatoes, zucchini, beans, carrots...with a further boost to fertility levels evident in the use of the "Rado Rock" dust available from Yvonne Rado. As usual, taste and quickly resulting feelings of well-being and strength and clarity and gratefulness were unmistakably present, and even the last extra large zucchini (at 25 inches a little over 10 lbs.) from the amazingly healthy, productive plant growing where I'd dug out an old tree stump, was tender and sweet enough to relish raw. I'm still cutting and grating it for salads, in fact, especially wonderful is an avocado and citrus juice dressing. The lettuce was the best, biggest, tastiest and most nourishing I've ever planted. I hope the pictures will give some perspective on their size and health and solidness, even if taste, color and overall healthiness won't be transmitted to ***SR*** readers.

Being very busy in the office most of the year didn't allow much getting out to visit other mineralized gardens, but I was glad to visit Larry Ephron's East Bay garden in September to see his first year results after adding about a 50 tons/acre rate of rock dust, combining some basalt dust from Lane & Sons of Massachusetts [plus glacial gravel dust from Rado Rock.] "Impressive" certainly applies once again; 10 foot sweet corn with a rich sweetness and flavor I hadn't tasted since "dining" in Yvonne Rado's Fremont corn patch about 4 years ago; 22 ft pole beans outgrowing

Don Weaver's Romaine (under yardstick) and Oakleaf (under rulers) lettuce after spring fertilization with about 20 tons/acre of Rado Rock's Nevada "dust" (a bit coarse in feel but very effective).

in friendly competition those I planted shown in ***The Survival of Civilization***; zucchini with rather massive and deep dark green leaves producing up to 7 pounders; beautiful, delicious and tall collards with that irresistible taste and color threatening stoves and kitchens with obsolescence....

Larry and I took some photos, and his report should be part of the revised and re-titled second printing of his book, originally titled *The End: The Imminent Ice Age and How We Can Stop It.* New title: *A New Earth: How We Can Quickly Heal The Planet, End The Greenhouse Effect, and Save Our Lives.* Larry expects it to be an even better tool for networking and organizing actions. He has also completed another 650 page book, *The Miraculous Diet: The Revolutionary Discoveries of Max Gerson, M.D.,* which I've proofread, and expect to be a major contribution. As Alice Walker puts it, "This is one of those rare books necessary for the healing of ourselves and the planet." Naturally, it gives major emphasis to remineralization and the eco-climatic crisis. People for a Future, 2140 Shattuck Ave., Berkeley, CA 94704, 1-800-441-7707 will continue publishing these books ($8.95 and $15.95, respectively, plus $3.00 postage and handling) and the *Stopping the Coming Ice Age* video ($29.95 plus $3.00 postage and handling, plus tax in CA).

The only other news I'll pass on now is in the class of "hearsay". If true it confirms a long held suspicion of John Hamaker, myself and others, and explains a great deal of the "silent response" to our attempts to initiate open discussion and debate. The total climate crisis and threat of reglaciation, as well as the lack of discussion generally, and the continuing inundation of the "public mind" with (repeat-after-me) "Global Warming", ignores the abundance of facts contrary to that pseudo-paradigm!

Larry Ephron and his glorious remineralized zucchini

A man in Southern California recently discovered *Stopping the Coming Ice Age* while turning the television dial. He called People for a Future to order a copy, plus the (sold out) *The End.* He said he'd heard about the danger of a new glacial period, and had been very concerned since about 4 months prior to seeing the video and hearing the Hamaker Thesis. He says a friend and colleague told him he had spoken about this climate shift danger with a top scientist at a major U.S. institution. The scientist supposedly said that he and scientists generally were not allowed to discuss this publicly, and he thought the overheating of the tropics and transfer of moisture to the polar system, initiating a glaciation, was already well established and likely irreversible. The man who called People for a Future said he'd try to learn more about this if he could.

Clearly "hearsay" can be stranger than fiction...but is this also the truth? I wish I could tell ***Remineralize the Earth*** readers and everyone for certain, one way or the other.

From Don Weaver's garden: left to right, examples of superb lettuce: romaine, butter and oakleaf.

Next page: NASA photograph of the Earth.

On Earthday Weekend

April 20, 1990

A few thoughts to share in honor of the spirit of life and nature's millions of earth species...

Creation continues.
We need to co-create the present and future.
They need not be created by the past.
Healing is a biological process- at the cellular level and the planetary.
We choose to nourish Healing,
or sometimes we forget.
We may forget and forgive... and align with Healing again.
Forgiving and being free of fear makes life fun and beautiful and Healing.
It almost makes you want to give and give until everyone and Earth is healed.
But fortunately that takes just about everyone so everyone can share the Joy.
Look at those beautiful clouds and that bright yellow star!!!
What might I and WE give?
Perhaps every EARTH DAY (oh, every day!) we might ask about true needs.
What are Earth's true needs?
I could tell you but would rather you not miss the fun of finding out...
There are clues all around. When your mind and heart are quiet and very sensitive you'll see them.
I do feel the Earth can yet be "saved", or Healed, or Regenerated or Restored.
Reducing and stopping the damage and pollution is, of course, a key.
Yet will it be possible if WE don't TOGETHER remember who we are...
And how, and what, to GIVE. Earth has set us such a good example!

Many Happy Earthdays
Don Weaver

Stone Age Agriculture

A Report on Glacial Gravel Dust

by David Yarrow

"History celebrates battlefields whereby we meet our death. It scorns to speak of plowed fields whereby we thrive. It knows the names of the King's bastards, but cannot tell us the origin of wheat. This is the way of human folly."

Anonymous French writer

I had never eaten a white beet. I bit into its soft white flesh and rubbed it with my tongue. An eruption of flavor sent my eyebrows skyward. Startled, I lost Tom MacDonald's words as my awareness focused on this intense sensation.

This wasn't just a new variety of beet--it was grown organically. But even that didn't account for such magnificent flavor. This beet was grown with glacial gravel dust. In May, I had heard New York's Agriculture Commissioner declare, "Organic advocates want to turn back the clock 100 years." The Commissioner underestimated the scope of history: Tom MacDonald is an organic radical who set his watch back *10,000 years.* Tom has begun using glacial gravel dust with results so satisfying he's given up all other fertilizers.

In 1970 Tom and wife Shelley discovered macrobiotics. After study in Boston, in 1974 they moved to Hannibal, New York near Lake Ontario, to begin farming. Tom says, "I began organic farming as a way to produce good products and as a livelihood. In terms of the environment, it's the future; there's no point farming chemically because it's the past."

In 1978 the MacDonalds moved to Perry City in the southern Finger Lakes to 30 acres of level glacial till with a large warehouse. The former owner--a Cornell University ag professor nicknamed "Nozzlehead"--had drenched the land with chemicals. To switch the fields to organic culture took several years, during which time Tom had to rent fields until the biological balances on his own recovered from their abuses. Tom still rents 20 acres, but plants only 25 and keeps the rest in green manures.

For several years Tom and Shelley marketed much of their produce in New York City's Greenmarkets, a network of farmers' markets in Manhattan. There, on the front lines of the food system, they dealt first hand with consumers who demand flavor and freshness, and who want organic. Today Tom manages a $120,000 per year, family-run organic vegetable operation, yet remains almost broke. Land and equipment mortgages yield a heavy debt load and other typical farm problems. Looking back, Tom reflects, "Farming organic meant a lot of costly experiments and lost time making mistakes, but my willingness to try things made me open-minded enough to try rock powder.

"Three years ago, 90 percent of our stuff went to Greenmarkets and we did a little wholesaling in New York City. Last year we sold to wholesalers in town and Northeast Coops in Boston because we didn't go to New York City. This year we'll do some wholesaleing in New York. Unfortunately it's still the same as 15 years ago, in that we export - we don't market as much locally as we could or should. I've tried to get out of that, but we'll have to go to the big cities another three years before local markets open up."

Shelley first heard of John Hamaker five years ago at a natural organic farmers conference when Joanna Campe talked on soil remineralization and the onset of a new glacial epoch. Later they got Hamaker's book *The Survival of Civilization* . Tom comments:

"When I read Hamaker I could see rocks were part of a soil building process. Hamaker says rock powder feeds microbial life in soil. It makes sense. Everybody studying biology learns about lichens on rocks, right? They told us freezing and thawing cracks rocks a little, then lichens and bacteria get in and work. But put a megadose of their food in there and all of a sudden you have an explosion of bacterial growth. It's obvious.

"It was easy for me, because every spring I go in the fields and there are all these rocks, so I take them out. I always thought, 'This is stupid. This *made* soil, and here I'm taking it out, getting tired and sweaty.' From a mechanical point of view, rocks are tough on your equipment, so you move them out of the way. But I knew it was silly, because this is the parent of soil. These rocks were left by glaciers, and I always wondered about grinding them. I said, "Instead of taking rocks out, I should grind them and put them back on the field for fertilizer.' I wanted to do it years ago, but didn't know how or why."

Tom's first experiment with glacial dust was four years ago. He says, "First time we spread it on half a rutabaga field. We got some in our truck– had to shovel it– it was a drag. Four weeks later I drove past and there was a line

Why Gravel Dust?

"Investigators find food is no richer in minerals than soil from which it comes. Depleted soils won't produce healthy nutritious plants. Plants suffering mineral deficiencies won't nourish healthy animals. Mineral deficient plants and undernourished animals won't support people in health. Poor soils perpetuate poor people--physically, mentally, financially."

Dr. Thomas Parran, M.D.
US Soil Conservation Service, 1945

Glaciation occurs when soil minerals ground from rocks by the last glaciation are so depleted they can't support plant life. Exhaustion of soil minerals initiates the chain of events which results in restocking soil with minerals and a new proliferation of life. Plants get cell protoplasm from soil microorganisms [which] produce protoplasm by taking elements from stones in soil, and combining them with carbon in plant or soil organism residue to make organic compounds.

When elements are no longer available in soil (the case at present), microorganisms die of famine, and plant life also starves to death for lack of protoplasm. Forests, jungles and other plant life [are destroyed by] disease, insects, drought, and fire. Ultimately most carbon in plants winds up as CO^2 in the atmosphere.

The natural system of soil remineralization calls for glaciation to start every 100,000 years. Glaciers grind rocks on earth's crust, and high winds carry dust all over the world. We happen to be due for glaciation now. The only way we can reverse the flow of CO^2 into the atmosphere and eliminate the onset of glaciation is to remineralize the world's soils to double and quadruple the growth rate of all plant life, or almost all of us will die. Fortunately, it is technically possible to mineralize soils.

Everything is connected to everything else. The basic supply of protoplasm comes from soil microorganisms. The quality, health, vigor, intelligence and longevity of all living things depends on the quality of soil life protoplasm. Basic to their health is the availability of elements in Earth's inanimate rock - the basic food of microorganisms, and hence of us all. We can have good social behavior in this country only if we have good health; we can have good health only if soil microorganisms are healthy.

Microorganisms extracted useful elements from rock long before there were higher plants--and they still do. Plants are predators like the rest of us--roots extract protoplasm from microorganisms and alter it to supply needed enzymes, proteins, hormones, etc. Shortage of soil elements used by microorganisms to make enzymes means shortage of enzymes, which means a shortage of compounds catalyzed by enzymes, and hence malfunctions in all lifeforms.

An increase of trace elements must accompany any increase of principal elements. To increase principal enzymes and proteins, soil microorganisms must reproduce abundantly to furnish protoplasm to plants. Microorganisms reproduce abundantly only when *all* minerals are present, along with plant residue to supply carbon for energy and protoplasm, plus nitrogen, oxygen and [sea solids] from air, and water. *All the elements are in glacial gravel.*

Soil almost fully demineralized since the last glaciation 10,000 years ago has led to the popularity of a chemical agriculture whose soluble chemicals acidify soil, destroy soil life, use up organic matter, and finally render soil useless. Unlike microorganisms, chemicals dissolve carbonates and other rocks, liberating the remaining useful elements, thus stimulating enough growth of microorganisms to support a crop. Unfortunately, the crop receives a short supply of unbalanced protoplasm. The result is a crop subject to disease, as are people and livestock who eat it.

John D. Hamaker
from *The Survival of Civilization*

"I always thought, 'This is stupid. This made soil, and here I'm taking it out.'"

where I stopped spreading and the rutabagas were four inches higher--nice and dark green. They grew faster with noticeable difference in size, color and taste--like they'd been fertilized."

Tom gets his dust from a gravel quarry nearby--a huge glacial outwash many miles big with water under it. Hamaker recommends glacial gravel over other rock because it's a mix of all types of rocks, assuring a supply of all elements. The quarry's big bucket scoop drops in the lake to come up with mixed rocks loaded on conveyers and crushed underwater because dust is an environmental pollutant. The washings settle out and are loaded on a truck, which Tom pays to haul and dump.

Outside Tom showed me his dust pile: 12 feet high and 30 feet across. Pointing to weeds around the pile, Tom observed, "Everyone knows about fertility in compost. When you have a compost pile, rain leaches nutrients out of the pile. There's so much fertility weeds grow high and green on the nitrates. The same happens around my dust pile. I let it sit a year and the weeds say, look it's compost. To me, that's impressive."

Hamaker says bacteria, fungi, algae and other microlife trap and hold water and nutrients in soil. Glacial dust feeds this microbial life to assure a teeming population to provide a vast, invisible reservoir to capture and recycle nutrients, and maintain soil structure, or *tilth*. Tom reports, "Soil scientists say if you have a bacterial explosion, you don't have to worry about nitrogen--your source is dead bacteria bodies. I've given up using other fertilizers. I buy rock phosphate in trade once in awhile, but I haven't gotten any for three years. I can get what I want from rock powder. Soil scientists say to lime soil to get the pH up and add calcium, but it also supplies trace elements to stimulate bacteria. Everyone knows lime loosens soil."

Tom hasn't put it on all his fields yet due to problems spreading it. He reports, "Last year we sifted rocks

The rocks' minerals provide electromagnetic charges needed to power enzyme reactions, transport nutrients and provoke our sensation of taste. Food grown in mineralized soil is not only stronger, brighter colored and more compact, but also has a stronger taste.

out and spread it with a little hand spreader. It had to be dry. Sometimes we had to poke it through and it flew out. I hope to get better coverage and results this year. My neighbor's going to bring over his big manure spreader – he can turn his chain on fast and it'll flail out the back.

"Due to problems with spreading, I'm not sure of my application rate. Last year I tried to get 5,000 pounds an acre, but I don't know. One farmer puts on 500 pounds per acre each time he plants grain. To get results, you may have to apply as much as five tons per acre – my opinion after farming 15 years and with dust three years. But I'm sure it works to get a little on each year. Hamaker says you can dump 20-50 tons - you won't hurt the soil."

It is necessary to fine grind the rock to increase the minerals exposed to bacterial action. A one pound stone's surface area is 12 square inches. If ground to medium sand, its surface area becomes 3,200 square inches; as very fine sand, its surface area is 16,000 square inches; as clay, 564,000. The smaller the size, the more rapidly bacteria can absorb minerals to build protoplasm. Here, too, Tom has problems.

"I have varying particle sizes. Some of it will work fast--it's like clay--real fine. Then it goes up to sand size, but it's not silica. Supposedly it will all go through 100 mesh screen, and some will go through 200."

Despite these problems, Tom says, "I'm real happy with it for very common sense reasons. I don't want to buy rock phosphate from Florida, or to keep animals so I can grow lush produce. Bio-dynamic people grow nice stuff, but I can't keep cows and be their master--I'm not comfortable with it. But I need more of what manure would give me. This way I get a similar response. And I believe trace elements are significant.

"Farmers give lots of attention to major minerals--nitrogen, potassium, phosphorus--a little to minor minerals, and a tiny bit to trace minerals. Because they get results from NPK fertilizer, they figured it was what we should do. But their results were unbalanced, producing unbalanced people. Now we have to emphasize trace minerals – the smallest elements. You know, "the least shall be first." If they're taken care of, the others are all right, because there's plenty of nitrogen if you have live growth of soil microorganisms."

In ***The Survival of Civilization,*** Hamaker wrote, "...in 1977 corn grown on soil mineralized with glacial gravel screenings was tested along with corn from the same seed grown with chemical fertilizer. Mineral corn had 57 percent more phosphorus, 90 percent more potassium, 47 percent more calcium, and 60 percent more magnesium than chemical corn. Mineralized corn had close to 9 percent protein--very good--for hybrid. All nitrogen in mineral corn (whose content is an indicator for protein) came from the air by way of biologic processes and was in amino acids of corn protoplasm; none as raw nitrate, precursor of carcinogenic nitrosamine. No pesticides were used; there was no insect damage.

"Most topsoil of the world has been stripped of all but a small quantity of elements. So it's no surprise chemical-grown corn has substantially less minerals than described in USDA's 1963 *Handbook of the Nutritional Content of Food.* Mineral corn was substantially higher in minerals than 1963 corn. As elements are used up, a poor food supply in 1963 has turned into a 100% junk food supply in 1978 [with] corresponding increases in disease and medical costs. Disease means enzymes are malfunctioning for lack of elements required."

The role of trace elements in human nutrition and health is a new field and still controversial. An often cited example is Hunza, a small country in the high Himalayan mountain valley. The health, strength and longevity of Hunzacuts is legendary. The key is that they irrigate their soils with milky meltwater from the Ultar glacier, the color is from rock ground beneath the glacier. Hunzacuts are virtually never sick or develop cancer. Many are active workers at 90; some live to be 140. This is well documented, yet health professionals ignore this and continue the hopeless search for manmade 'cures.'

The links between trace minerals and health may be uncertain, but for Tom flavor is the key. He told me, "I insist minerals create flavor in food. Dust fertilized plants have much stronger flavor. Bio-dynamic people know NPK fertilizers produce big plants, but they're missing flavor and enzymes." Minerals provide electromagnetic charges needed to power enzyme reactions, transport nutrients and provoke our sensation of taste. Food grown in mineralized soil is not only stronger, brighter colored and more compact, but has stronger taste.

Tom continued, "Americans eat too much animal food and have to reduce that and eat more plant foods. But you won't eat vegetables if they don't taste good. That's why we didn't eat them as kids--boiled, frozen peas taste a little, but they didn't taste that good. It's important to have good quality, tasty vegetables and fruit to get excited about. Our carrot juice this morning was unbelievable. If you want a taste treat, you don't have to get a milkshake."

Another concern is crop resistance to pests and disease. Tom reports, "Last year was difficult due to dry weather, so I still had problems with disease and insects. We produced crops, but we had to keep trying. I planted a lot in June, but it didn't rain until August, so parsnips and burdock came up in August. It's alright for them, but too late commercially. So last year I can't judge a lot because I couldn't control moisture. When I ran into bugs and disease, I thought about using the powder symptomatically. I was going to try to dust with it, but mine isn't that powdery. Maybe I can sift out really fine, clay size stuff.

"Last year I had problems with root maggot. I think there'll always be some problems; rock dust won't cure all those problems or eliminate the need for pesticides completely. I don't think you can make soil so balanced insects won't attack weak or diseased plants and finish them off. I can't believe a cabbage fly will fly past a cabbage - that's her optimum place to lay eggs--it's what the maggot eats."

Tom tried to interest other farmers in rock dust, with little success, and knows of few trying glacial dust. "Bob Cannard in California grows specialty herbs and vegetables with crushed gravel off the bottom of a river, plus oyster shells and compost. He's a prime supplier to the famous Chez Panisse restaurant. They said his stuff tastes good--it's got a really earthy taste, and is what the woman wanted in her restaurant. In the Northeast many growers don't know why they farm organically, so it's easy for them to miss this potential input to their farm. They're stuck in a manure mentality – throw on some manure and everything is fine."

Tom spoke on the rapid expansion of organic markets after Alar and Meryl Streep. "What's happening this year to organic is obviously good. We expect markets to improve, and to be able to sell faster and easier. It's unfortunate the emphasis is chemical residues, because it's more than that. It's a sustainable agriculture system. We grow food that's safe to eat and tastes good, but on a practical level it has a more normal, natural balance of vitamins, minerals and enzymes."

Asked what he'd say if New York's Ag Commissioner was to sit at our table, Tom was skeptical. "I have little faith in government. Basically I'd tell him to play teacher. There's lots of good information about ecological agriculture out there – just make it available. They've started to do that. Lots of things that can be switched quickly, but farmers aren't aware and are slow to change. Government can do a lot in terms of education.

"Changes are going to come, but by economic choice – by who consumers support with their money. Consumers are the most powerful ally of organic farmers producing quality food. If it tastes good, they like it and feel better after they eat it, then they'll buy it and put money into organic farmers and less in other hands, and we'll become more powerful. As *Mothers and Others for Pesticide Limits* said to chain stores, 'Give us organic; we'll pay for it.'"

As I packed to leave, Tom said, "I almost forgot my stone tools!" With excitement he went to the windowsill to retrieve two rocks. One – a nearly perfect sphere of tan, medium grain, dense rock--rested comfortably in my cupped palm. As I twirled it, Tom explained how he found this remarkably geometric rock. The other was a dark grey, flat oval which also fit well in my hand like a scraping tool.

As I gazed at these rounded relics, I tried to sense their history and learn their tale. Was this a Stone Age tool, left here 5,000 years ago? To my intuition, the rocks and Tom's story had the 'right feel.' I imagined the tan sphere being used to crush hard kernels of primitive corn and other grain. I remembered how for centuries humanity ground its grain between stones, mixing small amounts of rock dust with the crushed seeds, adding minerals to the grain. And grain was cooked in earthenware pots, adding more minerals to these ancients' diet. Today earthenware is replaced with metal, and stone grinders with high speed metal mills spewing superrefined products whose minerals are milled away. It is not only our soil that has lost its minerals.

I pondered the significance of the stone tools and Tom's glacial gravel pile. Five thousand years ago is halfway to the end of the last Ice Age. Do we indeed sit at the edge of a new glacial era, or just a period of climatic turmoil? Can we gain some wisdom from these ancestors beyond the pale of written history? I recalled Masanobu Fukuoka in *The One Straw Revolution:*

"The purpose of agriculture is not the production of food, but the perfection of human beings."

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A Round Table
on

Soil Minerals

Using Rock Powders in Farming and Silviculture

Saturday, March 23, 1991
Earthwise
Education Center
Cleveland, NY
(north of Oneida Lake in central NY)

AGENDA

Overview: global farming, forest death and food quality
Materials: survey of rock dust products on the market
Gravel Quarries: information on local sources of dust
Grinders: establishing a rock grinder in NY
Spreaders: equipment and techniques for applying dust
Bulk Order: cooperative purchase of a railcar load for 1991
Grant: drafting a research plan for federal funding

for more information
David Yarrow
P.O. Box 6222
Syracuse, NY 13217

Resources

Books

◆***The Survival of Civilization,*** by John Hamaker and Donald Weaver, 1982
◆***Entropy: Into the Greenhouse World,*** by Jeremy Rifkin, 1989
◆**The End: the Imminent Ice Age & How We Can Stop It,** by Larry Ephron, PhD, 1988
◆***Secrets of the Soil,*** by Christopher Bird and Peter Tompkins, 1989

Video

◆**Stopping the Coming Ice Age** (video), by Larry Ephron, 1988

Encourage your local library and bookstore to carry these books and video along with Remineralize the Earth magazine.

A Roundtable Report on Soil Remineralization

by David Yarrow

Second meeting planned for New York in March 1991

Saturday, October 21, 1990 another journey of a thousand miles was begun.

For me, it began harvesting morning glory seeds in the rain. I planted these beauties last year in a tiny plot of soil between the sidewalk and garage wall; I ran some string up a wooden post, and they gaily climbed to its summit. Then, last fall, I mixed a heavy dose of Colorado dust in this tiny patch of soil.

In spring the glories volunteered their own seed, and sprang quick to the top of the post to hang down in giddy, lost disorder. After a month of this worsening silliness, I ran a single wire up over the garage roof to the second floor dining room window. Tender vines ran rapidly to the window sill, and now hang as thick, hairy strings headed down for the garage, again, erupting in thick, profuse blooms all day.

But the real excitement is thousands of ripe seeds in hundreds of dry placental ovules. Truly from one seed have come ten thousand. To see plants grow lush vegetation and large fruit is a mark of both fertility and vitality. But to see such reproductive vigor is extraordinary, and identifies the presence of this crucial genetic quality. This abundant glory of seeds is a genuine testament trumpeting the value of mineral powders to restore life to soil, and everything that lives in and from the soil.

This reproductive rain of seeds outshines the many other evidences of the essential energy of plants fed this fine powdered rock. I got endless pounds of huge squash and six foot high heliotrope, but the morning glories won me over. Genetic seed vigor is the fundamental survival trait we need to stimulate in plants, and the dust did it.

And, from the dark side of this reproductive display, comes European news of post-Chernobyl research that rock dust treated plants take up far fewer radioactive elements, indicating plants have a selective wisdom to chose appropriate minerals from soil if offered a full menu of choices. In our world of nuclear detente, the remedy for too-heavy metal in our soil may be a megadose of micronutients.

So, on Saturday half a dozen of us discussed how to promote "rock dust" - feeding finely ground mineral powders to soil. Although turnout for this first-ever rock dust meeting in NY was light, we were very productive. We planned a bulk order of Colorado dust in March, reviewed a proposal for a farm research projects grant, and made plans for future meetings.

"This abundant glory of seeds outshines the many other evidences of the essential energy of plants fed this fine powdered rock. I got endless pounds of huge squash and six foot high heliotrope, but the morning glories won me over."

Bulk Order: Judy Roylance from Sag Harbor can arrange delivery of 50 lb. bags of ELX Planters Granules, a grey pelletized dust from U.S. Soil Mining & Manufacturing in Salida, Colorado and sold by Mountain Ark in Fayetteville, Arkansas (50 lbs. $22.49 + $3.95 s&h).

We chose this product because it has well-proven effectiveness, is of uniform quality, and is easily obtained in 50 lb. bags. As chelated pellets, ELX Planters Granules can be applied with conventional fertilizer spreaders, a must for farmers.

Minimum order is 100 bags (500 lbs.) shipped by truck from a distributor in Ohio. If we order 12.5 tons (500 bags), we can have it delivered by truck for less – direct from Colorado – and can arrange multiple stops for the truck across NYS. Minimum bulk order for unbagged dust is 23 tons.

We will schedule our first delivery of Colorado dust for March 1, 1991, and arrange for warehouses in different regions. In Central NY, Winston Gordon at Earthwise Education Center can warehouse dust, while in Albany, Dave Rivers of Young Oak Landscaping wants to order. I will ask Dan Winter at Crystal Hill Farm to receive and hold an order for western NY. Perhaps Moody Hill Farm can warehouse dust for the lower Hudson Valley.

Enclosed is an order form to buy bags of ELX Planters Granules. Order a bag to put on your own garden soil (even houseplants love it!). Buy a bag to try on one of your crops next year. Buy a bag or more to give to friends to try out. Suzanne Werner in Chautauqua County has decided to rebag a 50 lb. bag as Christmas presents - a global warming twist on coal in your stocking.

Promotion: We agreed to encourage other gardeners and farmers to try rock dust. I will send this mailing out to farmers in NY. Jo Clayson at the Permaculture Design School in Slippery Rock, Pennsylvania will promote interest in dust in western Penn., and Judy Roylance will visit Vermont to interest farmers in the Green Mountain State. Joanna Campe called today, and is in contact with a few interested farmers in Massachusetts, whose new Ag Commissioner is Greg Watson, an advocate of rock dust and formerly Director of New Alchemy Institute.

Next year I will do at least nine workshops on The Three Sisters to begin teaching native agriculture. The focus will be on mound culture of corn, beans and squash, but there will be lots of other elements to the program. Liberty, Justice and Peace are also on the day's agenda. At any rate, I will feature using rock dust as essential to mound culture and soil building.

One spin of this is that earthworms have quite an appetite for rock dust, so regular, small applications may be most effective to sustain a stable worm population in

"...earthworms have quite an appetite for rock dust, so regular, small applications may be most effective to sustain a stable worm population in the mounds; they come out at night and lick the dust off the ground."

Next Roundtable on Soil Minerals
Saturday, March 23, 1991
Earthwise Education Center
Cleveland, NY
Telephone 315-449-1907 or 315-675-8498

the mounds; they come out at night and lick the dust off the ground.

Next Roundtable: Another Soil Minerals discussion will be held on Saturday, March 23, at Earthwise Education Center near Cleveland, NY, north of Oneida Lake. By then the Colorado dust will have been delivered. The NOFA-NY annual conference is being planned for early March in Syracuse, NY.

A fall Roundtable will be held on Saturday, November 2 at Earthwise to evaluate the year's results and set sights for a new growing season.

Research: Because no farmers attended the Oct. 21 meeting, no plans were made for a serious scientific research project to test rock dust in controlled experiments in farm scale operations. However, everyone agreed to contact farmers and encourage them to test one or more bags of dust in the next year. We also would like to arrange for gardeners to test dust in a controlled manner as more evidence of its effectiveness.

Although we don't have a strong enough foundation to go after a research grant, we can nonetheless help collect information and data on using dust to improve and rebuild soils. We can develop simple tests for farmers and gardeners to conduct on test plots; we must be diligent to keep accurate data on these little experiments and stimulate word-of-mouth awareness.

Test Rock Dust: If any farmer or gardener would like to help test rock dust, and collect more data on its effectiveness, we can suggest four ways to participate:

1) Simple test: apply one material to a test plot and record results. This is simple and easy; just buy a 50 lb. bag, select a plot and a crop, spread the bag, and keep careful observations and data.

2) Controlled test: test one material on selected crops - treated and untreated in a controlled plot - at specific application rates; collect data on soil nutients, yield, vigor, hardiness, etc.

3) Series of experiments: help design and conduct a series of controlled experiments of several materials on select crops in dedicated plots; collect data on soil and tissue nutrients, yield, vigor, hardiness, etc.

4) Collaborate in scientific study: cooperate in a long-term study of rock dust in a carefully designed scientific protocol.

If you or anyone else would like to collaborate in any of these ways, please contact me. If, by January 15, we have serious commitments for on-farm research projects, a LISA grant could be drafted for next year. Such a grant could pay farmers to collaborate in a serious scientific study, hire a research coordinator, and pay to write and publish a Farmers Manual of Soil Minerals, perhaps a videotape.

The deadline for LISA grants has been moved to mid-summer, so we have several months to contemplate and draft a proposal for 1992 research projects. I think we had better go for one.

For a green and peaceful planet,

David Yarrow
(315) 449-1907

Order Form for Rock Dust

ELX Planters - 50 lb. bags of pelletized mineral powder from U.S. Soils and Mining in Salida, Colorado. Granular for application in conventional spreaders. Delivery will be in the first week of March to three sites in Western, Central and Eastern New York.

Price Schedule

1 bag	@ $20/bag		$___
2-10 bags	@ $18/bag	bags	$___
11-20 bags	@ $15/bag	bags	$___
over 21 bags	@ $13/bag	bags	$___

Please keep me informed about soil minerals and rock dust activities in New York. Enclosed is my $ donation to pay for future mailings.
Total Amount Enclosed: $_____

Name _____

Address _____

Town _____

State _____ **Zip** _____

Telephone _____

Mail to:
David Yarrow
P.O. Box 6222
Syracuse, NY 13217

From Dinosaurs to Indians

Or, Stopping the Coming Ice Age

by Judy Roylance

It sounded kooky to me. I knew dinosaurs went out with the coming of the Ice Age, but I thought another Ice Age was about as likely as the return of the dinosaurs. So I watched the video ***Stopping the Coming Ice Age*** with a mind stuffed with skepticism. I refused to be convinced of anything, but the idea of remineralization grew on me.

The soil was fertile. Years ago I found myself at a party without the inhibiting influence of my current partner. I am tone deaf and I was sober, but I sang a tearful duet of "Trees" (as in 'Only God can make a...'). I also gave a moving monologue on how the trees would survive without us, but we can't last without them. I surprised myself. Where had such passion come from?

I never answered that question, but I am beginning to see where it has led. My friends, both earthly and spiritual, kept urging me to get involved. I balked and stuttered. Then, between Thanksgiving and Christmas last year, as though I didn't have enough to do, I flew to Ohio and rented a truck. I drove 100 bags of Planters II Trace Mineral Fertilizer east. At headquarters they admit it is ground from rock, but r--- and d--- are four letter words. Leaving 50 bags with a friend in Philadelphia, I hauled 50 bags to Sag Harbor, New York. The eastern end of Long Island is not an ideal location for a central distribution point, but it is where I live now.

I no longer have to haul it from Ohio myself and I have a 24 oz. $2.50 size and a 64 oz. $5.00 size, as well as the standard 50 lb. bag for $20.00. I've learned to downplay the imminent arrival of the ice age and talk about an all-natural fertilizer that is less expensive and more effective than anything else around. I've sold some to an organic farmer who used it on his snapdragons. He told me they sure were nice snapdragons; he thinks he'll try more next year. A perennial grower compared it to his standard fertilizer and bought another 5 bags. It took 6 months to get paid, but he will need more in the spring. I've seen an improvement in anthracnose-infected dogwood trees in as little as 2 weeks. I used it on a black pine encaged in a sun deck 100 yards from the ocean. This tree had had one third of its branches cut away as a result of the turpentine beetle. Many other pines on the property have died; this one thrives.

I have become a believer. There are others. Native Americans understand. I've sold some to Mohawks in New York State and mailed 3 bags to a Cherokee Chief in North Carolina. I am beginning to get some help. There is a biologist out here who accepted the basic premise immediately, and is giving me leads and talking to his friends. There is a horticultural writer in Pennsylvania who understood its value at first hearing, and has been sharing his views with owners of mail-order catalogues.

I wrote my father, retired in Florida. I told him I was going to save the trees by remineralizing the soil, but it was a big project and I'd be busy for awhile. I could have told him I was going to stop the coming Ice Age, but it would have been too much for him.

Planters II

Trace Mineral Fertilizer is derived from a naturally occurring marine deposit, ground into dust, chelated for immediate availability and pelletized for easy application. For best results, the soil where Planters II is used should have a high organic content. The humus particles combine with trace minerals and are suspended in the soil solution until they are accessed by the plants. In this way they remain in the soil and are not leached away.

Rates of Application

175 lbs. per acre
150 lbs. per acre in rows
8 lbs. per 1000 sq. ft. of lawn
5 lbs. per 1000 sq. ft. of garden
10 lbs. per cu. yd. of soil mix
6 oz. per 1" of tree trunk diameter
6 oz. per small shrub
10 oz. per medium shrub
16 oz. per large shrub

Water well after application. For best results apply twice a growing season. Mix into soil or aerate every foot with a pitchfork or top sow. Although spring and fall are ideal, any time of year is appropriate. Do not apply on top of snow.

For houseplants:

1 teaspoon per 6" pot
1 Tablespoon per 12" pot
1 Tablespoon per 1 gallon pot

Water well, and reapply every 4 months. Ounces indicated are by volume; there are approximately 10 lbs. (128 oz.) per gallon.

Planters II
Trace Mineral Fertilizer
Distributed by
Roylance Environments
Rte. 1, Box 1398 Dogwood Street
Sag Harbor, NY 11963
(516) 725-1009

Write or call for Analysis and ordering information.

David Miller Reports On The Test Results Of Bob Love's Remineralized Carrots

November 1990

I would like to report briefly on the results of analyses made on carrots grown on Bob Love's Minnesota farm. We dug these from his recently frozen ground in mid-November, 1989, when I visited him to talk about his results with the dust and collect samples of it from him for use on my own experimental plots.

He had bought a load of gravel dredged from the nearby Mississippi River and had ground it himself, using a grinder provided by Konrad Ruckstall. Hence, it certainly qualified as being a mixed gravel of glacial origin. There was still some of it left on the ground, and it appeared to be very heterogeneous gravel. Bob generously provided me with several hundred pounds of the dust, which we dug and bagged for the trip back to Ohio. I ran it through my series of screens and found that 90% passed a 115 mesh screen, and 67% passed through a 250 mesh screen, so it also scored very high on its fineness.

After collecting the dust we dug carrots from the control and dusted plots and also bagged soil samples from his two test plots. We retired from the windblown fields to his home to warm up and chat a bit more, before I began my trip back to Oberlin.

The analyses were performed by the labs at Ohio State University's Ohio Agricultural Research and Development Center in Wooster.

On the soil samples: the dust raised his soil's pH from 6.9 to 7.1, not a lot compared to results I've seen with my soil, but still consistent with trends I've seen where dusts do routinely raise soil pH. By the way, this can be a rather beneficial effect dust has when you are dealing with soils badly acidified by atmospheric pollutants. As for differences in the soil's mineral contents, the dusted soil, compared to the non-dusted control soil, showed:

5%	increase in phosphorus
108%	increase in potassium
2%	decrease in calcium (not significant)
43%	increase in magnesium
10%	increase in the cation exchange capacity

Cation exchange capacity is a measure of a soil's content of negatively charged substances (both mineral and organic) and a higher number is considered an improvement in a soil's ability to retain mineral cations so they won't be leached away when rainwater causes runoff from a soil.

The carrots showed the following changes, reported again as percentage of dusted soil carrots over controls:

33%	increase in phosphorus
8%	increase in potassium
10%	increase in calcium
0%	change in magnesium
50%	increase in manganese
25%	increase in iron
5%	decrease in boron
100%	increase in copper
41%	increase in zinc
200%	increase in sodium

What I found most impressive about these results, especially when compared with my own results on a wide variety of vegetables, is the fact that there was such an across-the-board increase in nearly all the mineral nutrients tested, particularly the micronutrients, manganese, iron, copper and zinc. This would definitely seem to indicate that the dust has had quite a positive effect on creating a more favorable balance among the mineral nutrients in the treated soil. None of the vegetables I have grown have yet shown this kind of consistent increase in mineral content, though several have shown increases in fewer of the minerals tested for.

When I get such results (many of this year's crops are in the process of such analyses), you'll be among the first to hear about it.

David Miller

Bob Love Reports From His Minnesota Organic Farm

Each year I try to learn something from my SR garden plot. This is the third year after dust was applied; it continues to grow excellent produce in great yields. The area next to it is okay, but not great in production or taste. David Miller did a nutrient test on last year's carrots, and found the dusted area to have 2 - 4 times the level of minerals, and it shows up in the taste test. We discussed why this could happen in areas so close together, and in produce looking so much alike. We did not have the answers to that puzzle. I became more convinced of Hamaker's idea "minerals for microbes."

I then came in contact with Bruce Taines of *Taines Technology*, which works with 80 colony groups of soil microbes. He demonstrated the ability of A&L Labs to measure the microbial activity in soil, called a "formazon test."

Mr. Taines states that the detection rate low of 20 is the norm for 90% of the soil tests where chemical sprays and fertilizers are used. The level of 656 µg on the remineralized area and 566 µg on the control are possibly the reasons for a terrific live soil and plant response.

I will describe one plant, the radishes which I planted late in August. I got busy and didn't look at them until November 1, when I pulled the soil sample. It had frosted a number of times; however the radishes, cabbages and broccoli were still alive. I observed these plants as I approached the garden, wondering why I had left the beets this long in the garden. With a closer look, I realized the forgotten radishes looked like beets - a 5 gallon pail full, 4 inches in diameter, 5 - 6 inches long, and a stem 1 inch thick. They stood about 10 inches tall and were very leafy. They had split and continued to grow numerous times, giving them an odd shape.

I plan to work with SR on my Certified Organic farm. To me this program is a most sound and basic approach to natural production and land stewardship. However, it's just a dream for this 1000 acre farm until we get a break in dust production and agricultural policy.

Bob Love
Harmony, Minnesota

News from Keith Gray

Research Continues at the Panorama Gardens in New Zealand

Remineralization of vegetables and flowers utilizing homeopathic techniques shows a significant increase in minerals and in yields

What is taking place in Europe with regard to rock dust seems to be on all fours with what is happening in New Zealand.

There are more and more sources of rock dust and we have found a wider range and application of many different types of rocks. It has been a busy year and I have held a number of workshops round the country which have attracted considerable interest. I am now finding it much easier to get people to take part in the petrological (rock) experiments.

During the last 4-5 years when we used rock dust, it has been incorporated into the soil in a powdered form with very good results in most cases. However, we have now got a lot more sophisticated in our approach and apply these very finely ground dust in both liquid and homeopathic form. Both of these methods look most promising and a lot more research in these forms will be tried out in the near future.

The liquid application lends itself to a form of foliar spraying which can be adapted to irrigation on a large scale. In the process of foliar spraying some of the liquid dust also gets to the soil so both plant and soil get treated. The liquid spraying can be said to be both manipulative and prescriptive, as you can make up the spray to whatever form you wish, and can add or subtract whatever constituents you desire. Provided one puts in a wide range of rock dusts, we are able to produce the same type of petrological liquid as that produced by a glacier. In fact, we can probably out do the glacier, as the latter will grind only those rocks in its direct path. If those rocks are deficient in phosphate then a glacier can't do anything about it, but a human agency can bring in a phosphate rock from any part of the world to correct the deficiency.

The other method of application is to take one drop of these liquid solutions of rock dust, and take them into a homeopathic spray by potentising. This is even more manipulative than the liquid solution approach as one drop of potentised rock dust can energize hundreds of liters of water, and 100 drops can activate 50,000 litres of water. Better still is the fact that these homeopathic liquids can be stored for a very long time as they are prepared in alcohol.

"Provided one puts in a wide range of rock dusts, we are able to produce the same type of petrological liquid as that produced by a glacier."

I have a bottle of potentised rock dust which is made up of a mixture of North Carolina Phosphate, bentonite, basalt and Egmont rock. The Egmont consists of a mixture of alluvial gravel which would have about a dozen or more different kinds of rocks. This is made up to 6C dosage and one drop of this in 450 litres of water will cause a crystal pendulum to start gyrating in a clockwise circle. (Editor: in dowsing this is a strong affirmative response).

I have a black plastic tank of 450 litres, and when it is full I tip in a kilo of mixed rock dust, 5 litres of liquid nettle solution, 8 litres of comfrey liquid and a few drops of any other homeopathic liquid I think is necessary. This large potion is stirred up and then gravity fed over the garden with very good results. After the soil has been sprayed it is tested with a crystal which will react to what has gone onto the soil surface, and after a while, the plants will also throw off enough radiance to affect both the crystal pendulum and a diving rod. This effect will stay in the soil for 3-4 months and more.

There are some rocks which possess enough energy to set a crystal in motion, and if you run a diving rod over them the rod will dip down sharply as it passes over the rock. I am using these methods of selection on our rock dust searches as I believe rocks of this nature may be more effective as fertiliser than those that don't respond. Of course, there are some rocks that don't respond in the solid state but become very much alive after they have ground down to 45 microns or below.

There are a number of quarries visited where after the rocks are partially crushed, they are washed with water. The effect of this is that the very fine

Keith Gray gives workshops on remineralization and is an active member of the Soil Association of New Zealand. He is researching the use of rock dust by mechanistic means and homeopathically as well. He carries on this work at the well known and beautiful Panorama Gardens in Rotorua.

Remineralizing A London Garden

Excerpted from Pattie Barron's Gardening column of the ***London Evening Standard,*** *January 19,1990*

Greenie friends tell me I'm risking my life by growing greens in the middle of London, but those scared of death by vegetable, even if they're only planning on window-box lettuces, should draw comfort from the Ministry of Agriculture.

It recently issued a report stating that lead is not readily taken up by plants from soil, and that in the case of contaminated crops, much of the lead is removed with washing and normal culinary preparation.

Chris Scarfe, director of the Institute for Optimum Nutrition and a keen veg grower himself, contends that any lead content in home-grown vegetables is less readily absorbed by our systems if the vegetables are cultivated in mineral-rich soil. Thus Chris digs in crushed basalt rock to raise the mineral levels of his very own veg plot in Surbiton, along with organic calcified seaweed and spent mushroom compost.

"Basalt rock contains," believes Chris, "the full spectrum of minerals needed for optimum plant health, and hence human health. And it can double the size of your yield." Now you're talking.

Like me and Chris, get your mineral-rich volcanic rock dust from the College of Soil Research, 5 Chase Side Place, Enfield, Middlesex, EN2 6QA. Price £5.10 incl. p and p for a 4 kilo (8 1/2 lb. pack).

You can eat it too, or, better yet, rake it into the topsoil and let the weather do the rest. Could a radish ask for anything more?

In Memoriam

Robert Rodale
1930-1990

In gratitude for his great contribution to organic gardening, farming and health through Rodale Press publications and The Cornucopia Project and other projects of the Rodale Institute.

"Those flowers grown in rock dust have been twice the size of the control plants. In some cases the growth rate has been over 100%."

particles get washed out as a waste material and usually end up in a settling pond. After a period of time the ponds are dried out and the material is carted away and dumped. Recently I visited an andesite quarry and came home with some of this very fine dust to try out. It looks most promising as I have had good results with andesite in the past.

For the last five years we have been working with vegetables only but now we are looking at the effects of rock dust on flowers. The first trials have been done with calendulas. Those flowers grown in rock dust have been twice the size of the control plants, in some case the growth rate has been over 100%. This success in floriculture means we are going to go in for a great deal more flower growing in the next year.

After five years of experimentation with vegetables we know we can get a lot more production per square yard by treating the soil with a mixture of rock dust at the rate of 1 lb. of dust to the square yard or 2 tonnes to the acre. While this is very encouraging there have been times when we speculated on what effect this may have on the nutritional balance. In September 1988 we took the first steps on a 700 day journey to see if we could increase the mineral content of cereals by growing them in rock dust soil. A similar trial is being carried out with the carrots. The results in both cases have been most encouraging and they will continue. A graph of both results is enclosed for your information.

(The chemical analyses for this work are quite expensive but the local Biodynamic people have kindly offered to pay for the analysis work.)

The results from the graph indicate that the organic carrots had 100% more nitrogen, 50% more phosphorus, 50% more potassium, 33% more sulphur, 100% more magnesium, 66% more iron, and 100% more zinc. The inorganic carrots were in calcium (25%) and sodium (66%). There was no difference in the two varieties of carrots in respect to the elements manganese, copper and boron.

Some of the organic carrots have been left in the garden and they will be set aside for seed growing purposes, and this seed will be planted and subjected to further chemical analysis in 1991, depending on weather conditions.

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- Non-toxic- restores pH balance.

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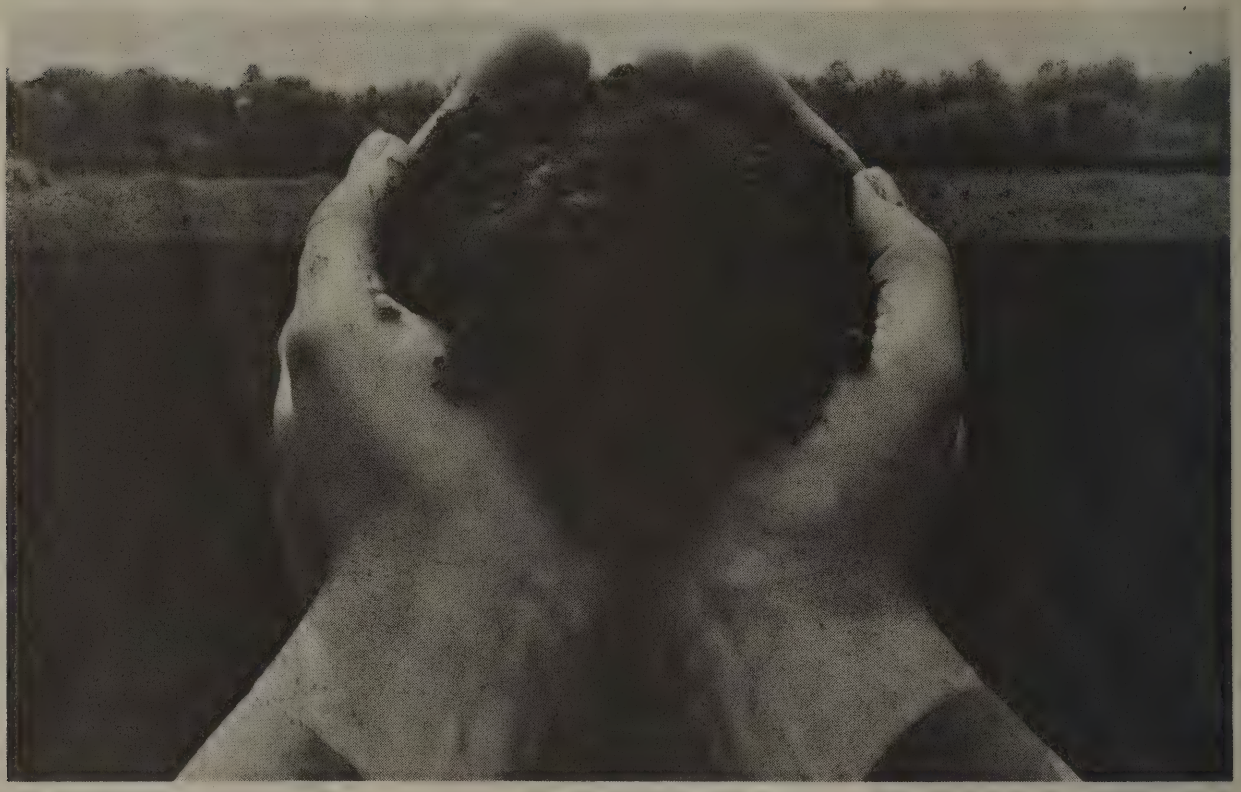
N-Viro Soil Named Top 1990 Sludge Technology By the U.S. EPA

A Technique Called N-Viro

Soil Remineralization Using Sewage Sludge Mixed With Cement Kiln Dust

by Tad Montgomery



Roughly 140 billion pounds of sewage sludge are produced annually in the U.S. in an attempt to separate our human wastes from the waters we mix them with. This number has steadily increased over the last two decades as more stringent waste water treatment regulations have been put into effect. Standard methods for dealing with sludge have included incineration, ocean dumping, landfilling, land application on farms and composting.

None of these alternatives is perfect, and the first three pose dramatic problems. Even the two which recycle the sludge, composting and land application, have disadvantages. They do little to deal with heavy metals, can create odors pungent enough to turn off the staunchest of environmentalists, and often function poorly in inclement or cold weather.

These facts have made for many problems to date, but there are ecological entrepreneurs at work who would change that. Pat Nicholson, whose business is to convert wastes into resources, has developed a new process, termed N-VIRO, to turn sludge into marketable agricultural and construction materials. This transformation is achieved by combining sludge with other waste products in a relatively simple and environmentally beneficial technique.

A Simple Process

The N-Viro method is a proprietary processes to thicken, condition, dewater, deodorize, stabilize and pasteurize waste water sludges by mixing them with cement kiln dust (CKD), a byproduct in the production of portland cement and lime, or with other similar alkaline materials such as fly ash from coal burning facilities. Disposal of the fine dusts, which are caught in the air pollution control equipment of cement factories or coal plants, has presented a significant pollution control problem for these industries. Considered from another vantage point, however, the dusts are resources, containing calcium, potassium, sulphur, magnesium and

---

Tad Montgomery has a Bachelors degree in Ceramic Engineering from Alfred University and a Masters in Environmental Systems Analysis from Humboldt State University. He is a consultant in the fields of waste water engineering and permaculture design, presently writing a book on ecological approaches to the treatment of waste water.

"I am very pleased to inform you that those who have contributed to the outstanding efforts in developing 'Advanced Alkaline Stabilization Process with Subsequent Accelerated Drying' have been selected to receive first place in the Technology Development category of the Environmental Protection Agency's 1990 National Sludge Use Awards Program....

We will officially anounce the national winners and present the awards on Monday, October 8, 1990, in Wash. D.C., at the 63rd Annual Water Pollution Control Federation Conference..."

William K. Reilly, Administrator U.S. E.P.A.

Above Photo: the locations of Plants, Pilots and Demos, March 1990

TABLE 1
Major and Minor Constituents in U.S. Cement Kiln Dust

Major Constituent	Range (%)	Mean (%)
Anions:		
Cl^-	0 - 12.0	.7
F^-	0 - .4	.1
NO_3^-	0 - 2.0	0.
PO_4^{3-}	0 - .2	0.
SO_4^{2-}	.4 - 32.0	8.
Elements:		
Al	1.0 - 5.0	2.3
Fe	1.0 - 4.4	1.5
K	.3 - 23.2	3.7
Mg	.2 - 2.0	7.8
Na	.05 - 2.8	.5
Si	2.7 - 11.1	6.4
Trace Elements: (ppm)*		(ppm)
As	1.3 - 518	24
Ba	<55	<55
Cd	<1.5 - 352	21
Cr	11 - 172	41
Cu	7 - 206	30
Hg***	<.13 - 1.0	<.13
Li	<4 - 76	18
Pb	17 - 1750	253
Sr	62 - 8750	670
Ti	500 - 2900	3530
Zn	32 - 8660	462

* ppm = parts per million.
** Cadmium concentrations were highly variable with many samples falling below detectable limits.
*** Mercury measurements were performed on only 16 samples.

other trace minerals. Consisting chiefly of minerals, CKD also has a high amount of potassium which volatilizes in the cement kilns and then condenses in the pollution control equipment.

One agricultural study performed through Cornell University found the dust to be useful as a potassium fertilizer with a liming effect comparable to that of commercial limestone. Many American cities generate such industrial waste byproducts, and the total U.S. production exceeds 14 million tons annually. Municipal waste water sludges are blended with these alkaline materials to produce the N-Viro products which can be used as a granular fertilizer, soil conditioner, topsoil substitute or construction material.

The patented N-Viro process is formally called "Advanced Alkaline Stabilization with Subsequent Accelerated Drying (AASSAD)." Dewatered sewage sludge is mixed with anhydrous CKD at a specific ratio in a screw auger or pug mill, stored in a static pile for at least twelve hours and then aerated.

Two different curing processes can be used. If the temperature of the surrounding environment is below 5°C (41°F), the mixture is held at a pH greater than 12 for 72 hours while simultaneously incubated for 12 hours at above 52°C (126°F). If the ambient temperature is above 5°C an easier and sometimes less expensive process can be used, in which the mixture is held at a pH of 12 for at least seven days and then stored for at least 30 days until the material dries to a minimum of 65% solids. The process therefore takes between three and seven days and results in a 40% weight reduction in the final product. High temperatures are achieved in the process by exothermic chemical reaction of the anhydrous alkaline materials with the sludge.

Reminiscent of Soil

The end result is a substance which resembles a cross between a fertilizer and soil. The characteristics of this product are, in fact, very similar to that of soil. One study which compared it to soils in Ohio found that the properties of density, mean granule size and volatile solids were very close. Many common soil microorganisms were also found, including a bacterial population in the order of one million per gram. Dr. Jeffrey Burnham, Professor of Microbiology at the Medical College of Toledo, has published a number of papers documenting how this process allows for the survival of certain (necessary) non-pathogenic soil bacteria while preventing the re-growth of pathogens and odor. This results in the ability to store the product during winter months, without smell, for later land application in the appropriate growing seasons.

The AASSAD process has the ability to destroy pathogens 10 to 1,000 times more effectively than traditional sludge treatment technologies (e.g. digesters).

TABLE 2
General Characteristics of N-Viro Soils (Logan, 1990)*

Characteristic	Unit	Value
CKD Content	% by weight	35
Moisture Content	% by weight	25-50
Material > 2 mm	% by weight	32
Mean Granule Size	mm	0.66
Bulk Density	g/cm3	0.7-1.0
Volatile Solids	% by weight	9.3
pH (1:1 water)		11-12
$CaCO_3$ Equivalent	% by weight	50-80
Organic Carbon	% by weight	12.2
Total Kjeldahl Nitrogen	% by weight	1.0-1.5
Ammonia - N	mg/kg	200
Nitrate - N	mg/kg	50
Phosphorous	% by weight	0.39
Potassium	% by weight	1.0
Calcium	% by weight	20
Magnesium	% by weight	1.0
Sodium	% by weight	0.2
Cadmium	mg/kg	9
Copper	mg/kg	80
Chromium	mg/kg	20-120
Nickel	mg/kg	35-137
Lead	mg/kg	100-120
Zinc	mg/kg	350-433

* Values are for Toledo, Ohio, and may vary for other locations, especially values for metals.

Odor reduction and heavy metal fixation are substantial benefits of the process. The pungent aroma of sludge disappears almost immediately upon mixing with the cement kiln dust. This is accomplished through drying, destruction of the anaerobic bacteria which cause smell, and odor absorption in much the same manner that baking soda works in a refrigerator. Heavy metal fixation occurs through conversion of the metals to inactive hydrates or insoluble carbonates. A large reserve of precipitated calcium carbonate is available in the process which also acts to bind up the heavy metals by providing a buffer to soil acidification.

Toxicity & Leachability

The EPA's standard toxicity test has been performed on this product to measure the amount of heavy metals which might leach out of the final material. The test is performed by adding .5 N (normality) acetic acid to the finished product for a specified period of time and measuring the concentration of metals which come out in the wash. The results have been promising, with very low concentrations of metals appearing at pHs down to 5.0.

In 1982 a study of kiln dust was performed by the Department of the Interior's Bureau of Mines called "*Characterization of U.S. Cement Kiln Dust*" (B. of I. Information Circular #8885 by B.W. Haynes & G.W. Kramer). In it, extensive characterization was made of 113 samples of CKD from 102 plants representing 70% of the industry in order to determine the environmental effects of kiln dust. The mineral analysis found that 94% of the samples contained calcite ($CaCO_3$), lime and anhydrite ($CaSO_4$) as major constituents. Varying amounts of quartz and dolomite were found, as well as other minerals including aphthitalice, arcanite, silvite, slaked lime ($Ca(OH)_2$), kaolite, gypsum and chlorite. The anion and elemental analyses are listed in Table 1. The study concluded by saying that CKD could be a good lime substitute and that any environmental considerations are minor.

Gaining Clout

This AASSAD process has achieved a high level of recognition by government officials and environmental groups. It is the first to be approved by the U.S. EPA as an acceptable PFRP* method for the treatment of sewage sludge since the EPA regulations were published in 1979. The N-Viro product also has EPA approval. Bob Bastian, an Environmental Scientist with the EPA's Office of Municipal Pollution Control, views the technique quite favorably. His department has been performing a technical evaluation this summer of N-Viro and other new alkaline stabilization techniques. The study is investigating such characteristics as long term cost, attraction of vectors, product longevity, trafficability and suitability as a landfill cover.

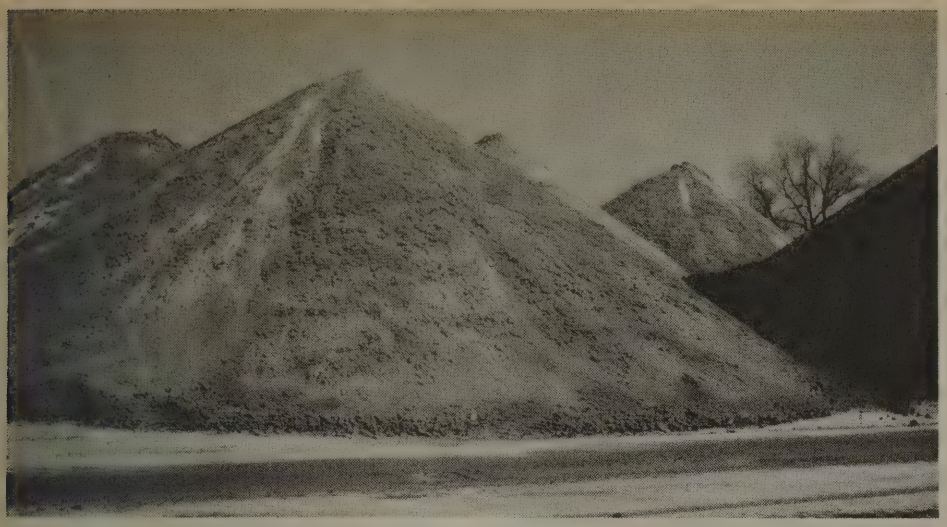
In the non-governmental sphere, this process was given a special Earth Day award by the National Environmental Awards Council's "Renew America" campaign. The National Certificate of Special Merit was awarded for outstanding achievement in the area of solid waste reduction and recycling. N-Viro was selected from more than 1,000 entries nationally in this first annual Searching for Success Program. Member organizations in NEAC include the Sierra Club, the Union of Concerned Scientists, the Audubon Society and the Wilderness Society. The aim of the prize was to identify and make available techniques or programs which successfully counter environmental threats.

More recently, on October 8, 1990, N-Viro received the #1 U.S. EPA Sludge Utilization Technology Development Award. This prestigious award was given at the national conference of the Water Pollution Control Federation and should open the way for broader acceptability.

Process Economics

The selling point which will turn the heads of municipal officials the quickest, however, is simple economics. This system can be less costly to cities due to a number of factors. To start with, it eliminates the expensive disposal of sewage sludge while at the same time creating a saleable product. The process can also reduce the need for expensive sludge drying equipment. This is due to the heat given off in the reactions of the alkalies.

The City of Toledo, Ohio, which pioneered the use of this process, found the capital cost to be roughly one-tenth the estimated cost of a comparable sludge composting process. Toledo expects to eliminate the cost of disposing of its sludge in two years, and hopes to make a profit from the sale of the fertilizer in five years. Operating and maintenance costs are competitive with traditional treatment processes and are far less expensive than alternative PFRP sludge pasteurization techniques. Costs have been estimated by the company at $125/dry ton average, including capitalization and operating expenses. This figure does not take into account expenses for sludge dewatering, or marketing and distribution of the product when they are necessary. The present range of costs for publicly operated treatment facilities is from $74/dry ton in Greenville, South Carolina to $280/dry ton in Jupiter, Florida. Variables in the



Storage in Toledo

cost of treatment include cost of the alkaline admixture (transportation is the biggest factor), type and character of sludge (percent solids is critical), whether climatic and temperature conditions require a structure, the size of the facility and whether it is run publicly or privately.

Odors & Acceptability

There are added advantages to this AASSAD process as well. Primary, perhaps, is that it is much more acceptable to communities than other sludge treatment techniques due to the significant reduction in odors. The technique also has smaller land requirements than other treatment methods due to a processing time of less than ten days. Storage of the final product may be required, however, to meet seasonal usage patterns such as in agricultural and construction applications. Finally, an AASSAD facility can be designed and built in less than six months because of its small size, low technology requirements and ability to use standard construction equipment.

A History In Agriculture

In the field of agriculture, N-Viro Soil has some well-respected advocates. Richard and Sharon Thompson of Boone, Iowa are pioneers in organic farming and have demonstrated techniques in sustainable agriculture to over ten thousand people. They have been conducting research in non-chemical farming since 1967, in conjunction with such establishments as the Rodale Research Institute, Iowa State University, the U.S. Department of Agriculture and the Soil Conservation Service.

Four years ago, in an attempt to stop depletion of potassium in their corn fields, the Thompsons built a sunken cement slab where manure from 150 farm animals is combined with the City of Boone's waste water sludge and cement kiln dust. After a year of storage the mixture, which has very good handling properties, is spread at 15 tons per acre on their fields in spring just ahead of the planter. The technique has not only increased potassium levels in their soils, it has allowed them, in conjunction with cover cropping and other soil-building practices, to grow corn at 150 bushels per acre without added nitrogen fertilizer. Their costs are $75 less per acre than those of conventional farmers.

The most prevalent use of the material in agricultural applications is as a liming agent. The alkalinity of the product is approximately 40% of the alkalinity of standard agricultural limestone (calcium carbonate) and the rate of reactivity is similar to that of agricultural limestone. When blended with soil, the pH immediately drops below 8.0. This eliminates concerns for over-neutralization of the soil as can result from the use of other liming agents.

Because of its neutralizing properties and low toxicity, the State of Maine has licensed the product as a lime substitute. The nutrient content of the material is also fair, with nitrogen, phosphorous and potassium percentages averaging roughly 1:1:1 and sometimes as high as 3:5:3, respectively. The finished material also contains many trace elements and a high organic matter content. (Table 1 contains a list of general characteristics).

In Florida the product is called "Paydirt" and marketed as a poor-person's fertilizer, with orange groves among the first users. The cost to farmers generally runs about half the price of a comparable commercial fertilizer with F.O.B. plant costs commonly at $1-5 per ton across the country.

When the N-Viro product is being considered for agricultural uses the potential for excessive heavy metals in the sludge from sources such as heavy industries without waste water pretreatment should be investigated. Kiln dust from cement factories using recycled oil to fire their furnaces can also be a significant source of metals.

Another minor concern with the use of this particular product for agricultural purposes is a low but significant salt content. There is the potential for potassium sulfate and calcium sulfate in the product as a result of sulphur in the cement kiln dust from the burning of coal. These salts can be toxic to some plants above a certain concentration, but are generally bound up by the high alkalinity.

Remineralization and Restoration Strategies

In the Northeastern U.S. and Southeastern Canada AASSAD products are being considered for aiding forests damaged by acid rain. Joanna Campe states that four years ago aerial surveys showed that 82% of the maple trees in the Province of Quebec were in decline. She proposes that in order to restore health to forests we need not only to bring the pH back to normal levels, but also to reintroduce minerals into the soil.

Ms. Campe believes that the N-Viro product would be a very good source of these since cement kiln dust is high in minerals, the sludge contains nutrients, and it could potentially be produced cheaply in every community in the region. Furthermore, she says that a one-time application might be sufficient due to the slow nutrient release characteristics of the material. The Massachusetts Maple Tree Growers Association recently asked Ms. Campe to address their annual forum and are excited about trying to remineralize their maple groves. Unfortunately, the Massachusetts Department of Environmental Protection has very strict guidelines for land application of sludge-derived products and permits are very difficult to obtain.

Another major application of AASSAD products is in the rejuvenation of areas of land that have been strip mined and need to be restored. The high calcium content is very beneficial in reclaiming these acidic soils.

Different Grades

Two types of AASSAD product are currently being produced by the N-Viro company: agricultural grade from standard sludges and construction or structural grade from sludges with excessive heavy metal concentrations. The latter material, which also has EPA approval, uses a greater amount of kiln dust or coal plant fly-ash to thicken the liquid sludges, stabilize and bind up the heavy metals.

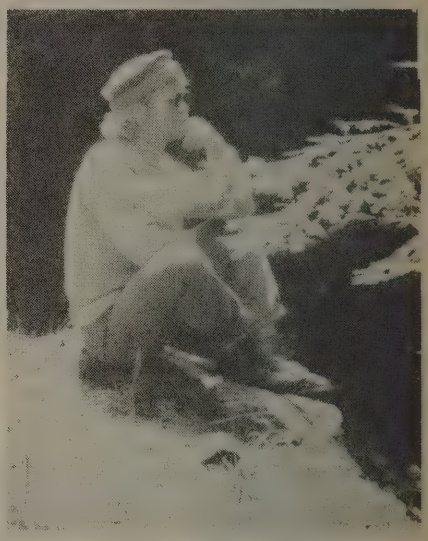
The product has excellent impermeability characteristics and leachate properties, with common uses as a structural material for landfill covers, road bedding and river dikes.

Cities which have implemented the N-Viro process include Toledo, Ohio; Jupiter, Florida; Portland, Maine; Des Moines, Iowa; Lexington, Kentucky; and Greenville, South Carolina. Roughly 15 more cities in the U.S. have plants which are expected to come on line soon and many others are in various states of development, have started pilot projects or are waiting for regulatory approval.

The biggest initial hurdle to implementation of these types of sludge stabilization programs has been securing markets for the final product. However, in recent months facilities in Maine and Florida have been able to move their material quickly with buyers accepting responsibility for transportation costs. Dr. Terry Logan, Co-Chairman of the US EPA 503 Proposed Sludge Regulations' Peer Review Committee and consultant to N-Viro Energy Systems, has undertaken considerable research as part of the Ohio Edison Program on marketing these products. His published report is quite positive in its assessment of uses such as in land reclamation where organic materials and alkalinity are required.

*Process to Further Reduce Pathogens

In Toledo, Ohio, 7000 tons of N-Viro are stored for seasonal use



The author studying glacial erraticism atop Mt. Jacura.

ERS in Action

The Earth Regeneration Society and its President Alden Bryant, have advocated a Climate Stabilization Program to many scientific organizations and political institutions over the years along with being actively engaged in major conferences worldwide. They have recently sent material to members of the United Nations, to some members of the International Panel on Climate Change, and to a select list of concerned groups in the U.S. and in other countries. Alden Bryant writes,

"The goal is to get massive work programs going in all regions of the world as soon as possible to reduce atmospheric carbon dioxide, the main forcing element in current climate change. We urge that wherever possible you put forward the broadest set of factors determining climate change, in as comprehensible a system as possible.

The Middle East crisis intensifies the need for solar and thermal electric technology development and other alternatives to replace the use of fossil fuels. At the same time, it demonstrates the urgency for all countries to be involved in a total climate stabilization era. What can the U.N. do?

It is time to combine preliminary plans from each country

continued on page 37

Bob Love Has News On The Hammer-roll Mill

I have information on another mill, the *Hammer-Roll*. The inventor, Mr. Ostreng, has material on and is very interested in soil remineralization.

Write or call :

Hammer Roll & Supply
Box 205
La Crosse, WI 54601
608-781-4420

Earth Regeneration Center COSTA RICA

by Greg Stout

The **Earth Regeneration Center** is a remineralization research project based in Costa Rica. The Center will provide demonstration and education on a wide spectrum of sustainable agro-ecology topics. Costa Rica is a magnet with global attraction which has been pulling scientists, researchers and businessmen interested in working with nature to save our planet. The favorable agriculture, forestry, ecology and political climate of Costa Rica supply the power for its magnetic attraction.

The core nucleus of the **Earth Regeneration Center** concept is agro-forestry/reforestation nurseries and food self-sufficiency demonstration gardens that will supply much-needed forest trees and healthy mineral-rich food. The trees will make the earth strong and healthy; the food will make the project workers and Center visitors strong and healthy. Planting trees has been proven to be the key to reducing CO2 in the atmosphere, which will stabilize the earth's climate and reverse man made erosion while providing a profitable renewable resource on which to base a new world economy.

The gardens and nurseries will be managed using low-tech methods within reach of peasant farmers and agribusiness land managers alike. Natural cycles and systems such as nutrient recycling, synergism and subsoil transformation, combined with the use of rock dusts and trace minerals soil balancing, will be demonstrated and taught to ecologically oriented vacationers, students and earth stewards on site at the Center. Reports, technical bulletins and other literature generated by the Center will travel the earth to those who want and need it through the rapidly expanding remineralization network and newsletters.

The Earth Regeneration Center will serve as an environmental/technical clearing house for broader earth saving goals such as bio-remediation (reforestation, earth decontamination and wetlands aquatic systems) and protection of natural bio-diversity (gene pool banking, wise management of natural forests and agricultural lands).

It is a large project, but the goals of human and ecological survival are important enough to warrant every effort now, so we will have a healthy and naturally viable planet to pass on with pride to future generations.

The international scientific and ecological community has expressed a high degree of interest and an excellent level of support for the **Earth Regeneration Center.** If you would like to become involved, or can help us in gathering ideas or resources for this important project, write to:...

UPGROW

Universal Peace Gardens Reforestation Operations Worldwide

A Nonprofit-Educational Corporation

Greg Stout
Project Director USA
33 Little Drive
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Edmundo Kandler S.
Project Director Costa Rica
APDO 2596-1000
Costa Rica

BRIX Testing

Or What You See Is Not Only What You Get!

by Yvonne Marie Rado

Conducting growth trials using glacial dust can sometimes render surprises that *seem* disappointing.. That was my experience during some recent testing of a newly acquired glacial dust.

I planted wheat in six pots, each with different glacial dusts, and two pots without dust. Previous tests using lettuce and cucumbers yielded obvious differences between the subject glacial and other dusts and controls. Imagine my disappointment when the wheat test yielded eight stands of wheat with no distinguishable differences! So that the experience wouldn't be a total loss, I decided to chew the wheat of the subject glacial to drink its juice. One delicious bite led to another as I marveled at the sweetness of the wheatgrass juice. Then I got the idea to taste a control. It was bitter! Aha! I was on to something. I ran to get my refractometer (BRIX-meter) to take a reading of each stand of wheat I had tasted. The ratio of the index readings was approximately 4 to 1, test to control.

My associate, Jon Biloon, had previously educated me to the idea that a higher BRIX reading meant a plant was healthier and, therefore, had resistance to pests and disease. As explained in an article on BRIX reading in *Acres, U.S.A.,*

"Within a given species of plant, the crop with the higher refractive index will have a higher sugar content, higher mineral content, higher protein content, and a greater specific gravity or density. This adds up to a sweeter tasting, more minerally nutritious food...It will...be more resistant to insects, thus resulting in a decreased insecticide usage...."

(More information, including a BRIX reading chart by Carey Reams, can be found in *The Anatomy of Life and Energy in Agriculture* by Arden Anderson, available from *Acres, U.S.A.)*

I have also noticed, time after time, that the test plots need less water than the controls. Even if the top growth is similar and there is no obvious difference to celebrate, I believe this moisture in the soil is significant. I take it as a harbinger that great things are happening - to manifest more overtly over time.

Observable results using glacial dusts are always fun to experience and very gratifying. However, demanding dramatic results immediately to justify using glacial dust overlooks Hamaker's thesis and the benefit of having food crops with an increased mineral content (both in concentration and number of minerals). Gigantism is not a guarantee of a healthy, nutritious plant. The BRIX level, as it relates to nutrient content of plants, is not accepted by all, but it does suggest that you could, indeed, be receiving more than meets the eye when using glacial dust!

ON SOIL REMINERALIZATION FOR
SUSTAINABLE AGRICULTURE AND CLIMATE STABILIZATION

A CALL FOR ACTION

by Fred B. Wood, IV and Fred B. Wood, III

This is the first of two articles – part one discusses the importance of remineralization in the context of glacial-interglacial cycles and the need for stronger remineralization programs; part two will discuss why remineralization should help stabilize climate under a wide range of climate scenarios.

Soil is part of the immune and nutritional system of vegetation. Healthy plants and trees require good soil – with adequate mineral content, organic matter, and microorganism activity. Currently, soils are being depleted due to a combination of natural forces associated with glacial-interglacial cycles and human activities such as nonsustainable agriculture, fossil fuel consumption, and deforestation.

Soil remineralization – using glacial rock dust and humus – can help restore the health of farms and forests. But for this to happen, as soil remineralization advocates, we must redouble our efforts to get remineralization included in local, national, and international sustainable agriculture, reforestation, and climate stabilization programs. Also, as advocates we must convince governmental and private sector leaders that remineralization deserves the immediate attention of those who wish to help stabilize climate and reduce the risks of global climate change.

The views expressed are those of the authors and not necessarily those of the CSIRI or other organizations with which the authors are affiliated.

Remineralization and Glacial-Interglacial Cycles

The rationale for soil remineralization is straightforward. The earth is presently in the later stage of the current interglacial. During late interglacial stages, soils are substantially depleted of key minerals due to natural processes.

Humans have further compounded this soil depletion through harmful agricultural and forestry practices, and through climate changes resulting from large-scale deforestation and consumption of fossil fuels. Soil remineralization can help offset or counteract the adverse effects of both natural and human processes.

Soil mineral content is closely tied to the glacial-interglacial cycles. Paleoclimatic, paleoecologic, and geologic evidence indicates that, for at least the last 2 million years, the Earth has experienced a series of such cycles. Each cycle consists of a glacial period lasting roughly 70,000–110,000 years followed by an interglacial period of about 10–12,000 years. The exact lengths appear to vary and are difficult to measure precisely, since the accuracy of dating techniques ranges from plus or minus several hundred to several thousand years. [1]

Nonetheless, the best scientific evidence (based on analysis of air trapped in ice, and of pollen trapped in ocean and lake sediments) indicates that the prior interglacial lasted from about 130–125,000 to 120,000–115,000 years ago – a period of 10,000 years. By numerous scientific accounts, the present interglacial started about 10–11,000 years ago.[2] Compared to the prior interglacial period, the Earth would appear to be in the late stage (near the end, in geologic time) of the present interglacial.[3]

The paleoclimatic and geologic records alone cannot tell us precisely how close to the end of the present interglacial we may be. Natural variability in the length of interglacials combined with measurement limitations mean that we could already be at the end of the natural interglacial cycle or we could be decades, centuries, or still even millennia away. Improvements in the accuracy of measurement techniques, including closer sampling of ice and sediment cores at the interglacial-glacial boundaries, should eventually provide more precise estimates.

The 1979 work of Genevieve Woillard in northeast France is one oft-cited effort to do more precise pollen analyses at the prior interglacial-glacial boundary. Sediment core was sampled in 250 micrometer thin sections at one millimeter intervals, with each millimeter equivalent to 6 plus or minus 3 radiocarbon years. The results indicated that changes from temperate – oak-elm-ash-hazel – to boreal (subarctic) – fir-spruce-pine-birch – forest vegetation took place within a 150 year time span, with key transitions perhaps in as little as 20 years about 115,000 years ago. The Woillard work has been interpreted as suggesting that interglacial-glacial transitions can occur in just a few decades, and that the Earth is presently in such a transition. Indeed, Woillard concluded that boreal forests replace temperate forests at the end of all interglacials, and that we "cannot exclude the possibility that we already live at the beginning of the present equivalent of the terminal interglacial pollen zone."[4]

For soil remineralization to be most effective, we need not know precisely where we are in the present interglacial--only that we are in the late interglacial stage that is characterized by mineral deficient soils. The immediate, critical concerns for human civilization are restoring health to the soils and stabilizing global climate. At or near the transitions between climate regimes, from interglacial to glacial, changing weather patterns are likely to adversely affect crop growing seasons in the temperate zones, further stressing agricultu-

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ral areas already hampered by soil deficiencies and water shortages. Without strong action, the result could be massive crop failures and widespread starvation.

The Soil-Vegetation Cycle

The mineral content of soil tends to degrade over time due to the natural recycling of forest and vegetation cover and the effects of local climate. For example, in a typical mid-latitude deciduous forest such as in the Shenandoah National Park in northwestern Virginia, U.S.A., the oak trees may have recycled 50 times over the last 10,000 years (assuming an average lifetime of 200 years). The organic and mineral content of the soil can be partially maintained by decayed plant and tree matter, but even in healthy ecosystems, the total mineral content is slowly depleted through natural cycling. Local rainfall and snowfall also can contribute to soil runoff and erosion--and the loss of key nutrients--although the effect is minimized if the natural vegetation and forest cover are preserved.

The analysis of pollens and soils from ocean and lake sediments and glacial loess indicates that soil quality and mineral content are highest in the early stages of an interglacial period and decline during the interglacial to the point where soil is substantially depleted at the onset of the subsequent glacial period. The vegetational patterns appear to correlate closely with soil quality.[5]

A typical European (western Ireland) successional pattern from a glacial climate through an early, middle, and late interglacial climate involves the following:

The soil shifts from skeletal mineral soils, to unbleached mineral soils, to fertile brown soils, and finally to peats and acid humus; the vegetation shifts from open herb assemblages, to juniper-birch-pine woodland, to pine-oak forest, and to yew-spruce-rhododendron and heather.

For comparison, a pattern in North America (Florida) involves, for soil, a shift from active sand dunes (glacial), to stable sandy soils (early-mid interglacial), to leached soils and peats (late interglacial). The vegetation shifts from open prairie vegetation, to oak scrub-hickory, to pine-oak woodland, to pine woodland with bogs and swamps.[6]

Depleted soils in the Northern Hemisphere mid-latitudes are eventually replenished in large part by glacial movements occurring over thousands of years. During the height of the last glacial period, about 18,000 years ago[7], major ice sheets covered much of what is now Canada, the northern United States, and northern Eurasia.

As these ice sheets grew, they ground up and transported large quantities of rock from mountains and valleys in their path. The slow advance of these ice sheets from about 110,000 to 18,000 years ago, and then their subsequent retreat from about 18,000 to 8,000 years ago, ultimately distributed "glacial rock" over much of the Northern Hemisphere mid- to high-latitudes, both by direct glacial movement of rocks and by water borne transport of glacial till and wind-blown spreading of glacial dust (known as loess) for hundreds and sometimes thousands of miles beyond the southernmost extent of the ice sheets.

This is one of nature's major ways of remineralizing the Earth's soils in the temperate and boreal regions of the Northern Hemisphere. Weathering of mountains and river basins--through seasonal weather events such as freeze-thaw cycles and storms--is another way; volcanic activity is a third way. The remineralizing effects of ice sheets in the Southern Hemisphere are much more limited, because the Antarctic ice sheet is surrounded by ocean and because, overall, the Southern Hemisphere has twice as much ocean area as the Northern Hemisphere. Some remineralizing does take place in areas in or near major alpine glaciers and ice caps (the Andes in South America). Overall, the areas remineralized through the glacial cycles include the bulk of the world's temperate and boreal forests. The other major forested areas lie in tropical zones--the tropical forests of Central and South America, equatorial Africa, and South and Southeast Asia. Tropical forests do not appear to depend as much on the soils for necessary minerals, but on complex multi-story ecosystems reaching from the ground to the tops of the tropical forest canopies. Tropical forest soils typically are thin and deficient in both mineral and organic content. Deforestation of many tropical forests has demonstrated that in these areas the soil denuded of its natural ecosystem cannot support vigorous forest growth.

Remineralization and Climate Stabilization

Over the last two hundred years or so, humans have been accelerating this soil demineralization through high-input, nonsustainable agriculture and through deforestation. In addition, humans have been burning fossil fuels that contribute both to climate changes associated with an enhanced greenhouse effect and to acid precipitation. The best available scientific evidence suggests that climate and pollution stresses, combined with declining soil quality, result in further deterioration of agricultural and forest lands.[8]

Soil can be viewed as part of the immune and nutritional system of vegetation. Healthy plants and trees require good soil--with adequate mineral content, organic matter, and microorganism activity--that provides nutrients to the vegetation and makes growth possible. Without proper nutrition, plants and trees--like people--are weaker, more susceptible to disease, and generally less able to withstand the stresses of life.

Soil remineralization should be an attractive adjunct to sustainable agriculture and forestry and reforestation, thereby contributing to climate stabilization. Soil remineralization is still limited largely to the small-scale organic agriculture community, and is not yet included in the action programs of the major governmental or environmental groups. To date, only very small, alternative environmental and organic agriculture groups are actively promoting soil remineralization, although these groups have powerful--but underutilized--evidence in the research reports from, for example, Austria and Germany.[9] (Interestingly, some mainstream scientific groups recently have supported a form of ocean remineralization.[10])

The absence of remineralization is particularly striking, given that remineralization, at least at the conceptual level, appears noncontroversial and scientifically sound, and that numerous other policy actions have been identified and supported by the major environmental groups. Many policy actions are now the focus of intense governmental and scientific scrutiny. The most commonly discussed types of policy actions include: energy and water conservation, natural resource conservation generally, renewable energy, recycling, sustainable agriculture and forestry, forest preservation, and reforestation.[11] Remineralization is a logical addition to

the core list of possible climate stabilization actions.

Europe has a long tradition of remineralization research and, recently, application. The results, however, are not yet being used in European, U.S., or international climate programs.[12]

Need For Remineralization Action

Soil remineralization needs to become part of mainstream climate stabilization programs. Remineralization projects to date have been very small-scale, widely scattered, and lacking a coherent policy framework. The results of these projects, while compelling as a whole, generally have not been sponsored by established university and governmental agriculture and forestry research programs, and typically have not been written up in the referred scientific literature. This needs to change if soil remineralization is to get the attention it deserves.

Remineralization logically fits into the agriculture and forestry research programs of state, national, and international governments. In the United States, for example, remineralization should be included in the U.S. Department of Agriculture's soil conservation and forestry programs (perhaps with lead roles assigned to the U.S. Soil Conservation Service and U.S. Forest Service), and eventually in the Extension Service's many programs for assisting farmers, gardeners, and foresters at the local level.

Expedited pilot projects are needed to test a wide range of mineral additives (using a variety of glacial rock--including gravel and gravel dust from glacial valleys, streambeds, and other natural deposits--with different mineral compositions and particle sizes) under a range of soil, vegetation, geographic, geologic, and climatic conditions. The pilot projects also need to consider different methods for preparing (including grinding), transporting, storing, and applying the glacial rock dust--alone or in combination with organic matter (humus, compost) and/or water (a glacial slurry).

The results should help identify the remineralization strategies that are optimal for both domestic and foreign sustainable agriculture and forestry and reforestation. Undoubtedly, the optimal methods of application will vary widely. For example, on the low end of the scale of difficulty, farmers with a level terrain and preexisting fertilizing equipment should be able to spread or spray glacial rock dust just as they would any other fertilizer. At the high end, foresters dealing with a rugged terrain where fertilizing equipment does not work may need to resort to "volunteer" hand application, supplemented by aerial spreading by helicopter or airplane in priority areas.[13]

As remineralization advocates, we need to redouble our efforts to prove that remineralization works and convince governmental, agricultural, forestry, environmental, and climate change officials at all levels to support remineralization.

As private citizens, we should take to heart the Earth Day 1990 motto "think globally, act locally." Here are some action steps we all can take:

1. Experiment in our own gardens and farms using different combinations of glacial rock dust and humus to remineralize soils for growing vegetables, fruits, flowers, and trees. Use standardized methodologies and keep a record of the experiment and the results, with standardized reporting formats, so that the pilot tests will be scientifically valid and the test results will be publishable.
2. Ask our local, county, or state agricultural department or extension agency to develop the capability to test glacial rock (and dust) for mineral content, just as many now test for soil acidity.
3. Encourage local garden supply, hardware, and farm supply stores to carry glacial rock dust in both convenient bags (e.g., 10, 20 and 50 pound sizes) and in bulk quantities.
4. Seek local, state, or federal financial support for pilot tests of remineralization, for example as part of urban tree planting and rural reforestation programs.
5. Encourage local organic food stores and cooperatives to carry literature on remineralization and related advocacy groups.
6. Ask our local or county agricultural extension agent to carry literature and provide information packets and basic instruction on remineralization. This usually will first require training of the extension staff itself in remineralization theory and practice.
7. Collaborate with local tree planting and organic farming groups so that remineralization becomes part of their overall strategy.
8. Encourage local elementary and secondary schools to include remineralization projects as part of their science, ecology, and nutrition classes.
9. Ask local and state science museums to include remineralization information booths and demonstrations as part of their exhibits.
10. Discuss remineralization in letters to the editor of our local newspapers, and meet with the science editor (or other reporter) to propose a news or science feature story on remineralization.
11. Collaborate with local community college or university faculty in departments of agriculture, ecology, forestry, nutrition, and the like to encourage them to teach remineralization in their classes and write scientific papers on remineralization results for publication in referred journals.
12. Suggest remineralization projects to local 4-H, Brownie, Cub Scout, Girl Scout, Boy Scout, and similar youth organizations with an outdoor orientation.
13. Write up articles on remineralization for publication in newsletters and journals of the mainstream (as well as alternative) scientific and environmental groups.
14. Write letters and meet with officials of the local, national, and international environmental and climate research programs to insist that remineralization be included.

In Conclusion

A wide range of concerned scientists and citizens are advocating action now to reduce the risks and adverse impacts of nonsustainable agriculture, deforestation, and fossil fuel consumption under a range of climate change scenarios (global warming to cooling and anything in between).

Soil remineralization is one of those actions that seems viable and helpful, regardless of what the future may hold. If this analysis is correct, soil remineralization deserves a place in the consensus package of climate stabilization actions being developed by concerned environmental, scientific, governmental, and industrial groups. But as remineralization practitioners and advocates, we are going to have to redouble our efforts, along the lines outlined above, if we wish to see the vision of remineralization become a widespread reality in the near future.

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8 See, for example, R.M. Klein and T.D. Perkins, "Cascades of causes and effects of forest decline", *Ambio*, Vol. 16, 1987, pp. 86-93; S. Nilsson and P. Duinker, "The extent of forest decline in Europe", *Environment*, Vol. 29, 1987, pp. 4-9, 30-31; B. Prinz, "Causes of forest damage in Europe", *Environment*, Vol. 29, 1987, pp. 11-15, 32-37; K.E.F. Watt, "An alternative explanation for widespread tree mortality in Europe and North America", *Newsletter of the International Union of Societies of Foresters*, Vol. 25, 1987, pp. 8-9; and J.B. Smith and D.A. Tirpak (eds.), *The Potential Effects of Global Climate Change on the United States*, Draft Report to Congress (Washington, DC: U.S. Environmental Protection Agency, October 1988).

9 Many of these groups are affiliated with the soil remineralization network and so-called "Hamaker Co-ordination" whose activities and views are reflected in the pages of *Remineralize the Earth* (*Soil Remineralization*), *Solar Age or Ice Age? Bulletin*, *Solstice*, and materials issued by the Earth Regeneration Society, New Alchemy Institute, People for a Future, and a variety of other grassroots environmental and organic farming initiatives. The pages of these newsletters contain numerous accounts of successful remineralization using various forms of glacial rock and volcanic dust. See, for example, D. Mann, "Bread from Stones", *Solstice*, May 1988, pp. 6-9, 50, 52-54, which states "At the Bavarian Research and Experimentation Institute for Forestry in Munich, researchers have just published the results of over 60 years of carefully controlled experimentation with rock dust on pine seedlings. Their work showed impressive gains after 6 years; 20 years after treating the new seedlings with rock dust, the wood volume was four times higher than in the untreated areas." These and other European remineralization research results need to be translated into English and widely disseminated.

10. The National Research Council and some leading scientists have endorsed pilot tests on fertilizing parts of the oceans with iron, in order to stimulate growth of plankton that consume carbon dioxide. See J.H. Martin et.al., "Iron deficiency limits phytoplankton growth in Antarctic waters", *Global Biogeochemical Cycles* 4:5-12, 1990; Dugdale and Wilkerson, "Iron addition experiments in the Antarctic: a reanalysis", *Global Biogeochemical Cycles* 4:13-19, 1990.

11. These policy actions are included in the action programs of major environmental groups such as the Sierra Club, Natural Resources Defense Council, Environmental Defense Fund and Greenpeace, as well as the smaller environmental groups. See S.H. Schneider, *Global Warming: Are We Entering the Greenhouse Century?* (San Francisco, CA: Sierra Club Books, 1989); J. Leggett, *Global Warming: The Greenpeace Report* (Oxford: Oxford University Press, 1990); A. Bryant, "Analysis and planning for CO_2 reduction and climate stabilization", in *The Energy Industries in Transition 1985–2000*, Part 1, Conference Proceedings (San Francisco, CA: International Association of Energy Economists, 1984), pp.579-593, reflecting the views of the Earth Regeneration Society; and L. Ephron, *The End: The Imminent Ice Age and How We Can Stop It* (Berkeley, CA: Celestial Arts, 1988.

12 The U.S. has a history of silvaculture research, including forest fertilization, but this has not, at least yet, extended to soil remineralization in forested areas. See G. Marland, *The Prospect of Solving the CO2 Problem Through Global Reforestation*, DOE/NBB-0082, TR039 (Washington, DC: U.S. Department of Energy, Office of Basic Energy Sciences, Carbon Dioxide Research Division, February 1988.

13 A comprehensive report on soil remineralization is needed. A good prototype is the report on liming prepared for the National Acid Precipitation Assessment Project (NAPAP). See H. Olem, *Liming Acidic Surface Waters*, NAPA Report 15 (Washington, DC: NAPAP, July 1990), that covers selection of liming materials and the techniques (e.g., hand, truck, boat, helicoper, plane), dosage, timing, location and cost of liming.

Shape Your Own Experiments With Remineralization And Contribute Data To An Ongoing Research Project

by Stephanie Sable Bierman

Finely pulverized rock, called rock dust, has been found to substantially increase crop yields and make plants so healthy that (1) insects do not attack them, (2) disease does not infect them or they heal themselves of disease, and (3) they can endure a 5 to 10 degree drop in temperature.

Our dying forests and farmland both have been rendered acidic by acid rain and NPK fertilizer. Acid has the effect of leaching mineral nutrients out of the soil, thus gradually making forests and farmlands deficient in essential nutrients.

Groups in Europe are successfully restoring dying portions of forest to health and increasing growth rates of young trees by simply sprinkling rock dust over the ground. Farmers in the British Isles are using rock dust on their pastures and getting lusher growth and healthier, leaner sheep and longer, finer wool. Cows will actually eat whole buckets of the stuff, and they prefer hay grown on rock dust.

Bob Cannard, an organic farmer in Sonoma, California, has used rock dust exclusively as fertilizer for 5 years. He grows 150 varieties of vegetables and fruits and provides the world famous Berkeley restaurant, Chez Panisse, with all their produce. He reports his plants are all healthy and he does not have an insect problem at all He is the son of a farmer and has been farming for 20 years on his own. He says that since he has been using rock dust his plants endure extremes of temperature better, and his citrus can go 5-10 degrees lower before becoming damaged.

Sources of rock dust are any igneous rock--particularly those which are at least 50 percent Basaltic or ground granite dust, or gneiss, a type of metamorphic rock. Asphalt manufacture requires that rock be ground to 200 mesh screening, and this is perfect for rock dust. Normally, a quarry exists within 20 miles of road building or repairing anywhere, as the cost in road construction is in transporting the materials to the road site. Julius Hensel, the man who discovered rock dust, insists that a mixture of different kinds of rocks gives the best results. Often river rock that has been crushed works well, as it is made of many types of rock. You should be aware that not all types of rock dust will help the soil equally well; this is an area for future study.

John Hamaker has tried putting huge amounts of rock dust on soil and has boasted yields up to four times their former capacity, using between two tons per acre minimum, up to 180 tons per acre. The rock dust is lightly tilled under. The good results apparently continue for years after one giant application. Too much extremely fine rock dust, however, can become like concrete and be counterproductive.

Bob Cannard uses another technique. He claims that too much rock dust is bad for the plants ("too strong") and he uses 50-200 pounds per acre. He goes around each plant and places a teaspoon to a tablespoon around the base of each plant, and is happy with the results, although he didn't boast of greatly increased yields. He repeats the application each year.

How does rock dust work? Microorganisms actually ingest rock from the surface of tiny particles of rock. These microorganisms grow and multiply to form humus, the organic part of the soil which makes ordinary sand become spongy, dark and able to hold moisture. Thus rock dust produces a large "crop" of microorganisms which feed plants with abundant nutrients. Root hairs actually grow from microorganism to microorganism and ingest the nutritious protoplasm within each organism. Many people look askance at the notion that microbes "eat" finely pulverized rock, but this has become an accepted fact in the scientific community. In fact, John Benemann, PhD, biochemistry, was hired by the mining industry to develop strains of bacteria to be used commercially in the mining of metals to break down ore.

Alex Podalinsky, a biodynamic farmer in Australia, has shown that plants feed on humus. In *Secrets of the Soil*, he is quoted as saying:

"Humus and roots are made for each other. A really perfect match. At the height of Spring growth a jar full of humus is buried in a biologically active working pasture about four inches below the surface. Six weeks later, the brown spongy substance has completely disappeared and the jar is solidly packed with nothing but white hair roots that can be extracted from it only with great difficulty. Once pried out, they appear as spankingly clean as if they had been thoroughly laundered and dried. The roots have invaded the jar to ingest every smidgin of the humus, not just the soluble elements within it, clearly illustrating that humus is plant food of first priority and choice." (p. 54)

This evidence is in stark contrast to what chemical companies have been saying for over 100 years. We have been led to believe that plants can ingest nutrients only in the form of dissolved minerals, and yet, at the same time, they claim that pesticide molecules, which are enormous, enter a plant through the root system. They have said the main nutrients are NPK, or nitrogen, phosphorus, and potassium.

Justus von Liebig, the man who invented this theory, by burning some plants and then analyzing the ash, was vehemently opposed to the idea that humus or decayed organic matter was the basis for the growth of plant life. Chemical companies started making new chemical fertilizers based on his theory, but when he announced ten years later to the world that he had made a mistake, and humus was essential to plant life, the chemical companies were making far too much money on the new fertilizers to stop making them.

Unfortunately, these new fertilizers unbalanced the condition of the soil and weakened the resistance of plants. This weakening caused insects to begin ravaging the crops, making it necessary to develop pesticides to kill off the insects. Thus the chemical companies doubled their sales by promoting both products, whereas for eons neither had been required at all. (For more information see *Secrets of the Soil*, Introduction.)

If the soil is dead where you are applying the rock dust, it is essential to add manure to the soil as well. The reason for this is that the manure provides microorganisms to ingest rock dust, as well as rendering the soil more acid which helps the rock dust to be dissolved more quickly.

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"Life and Death in the Forest," p. 199
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The Survival of Civilization, by John Hamaker and Don Weaver

Remineralize the Earth

Superbiomin, by Robert Schindele

Bread from Stones, by Julius Hensel

How To Set Up A Rock Dust Experiment

1. Follow the instructions at the end of this section. If you have a small space, you will have fewer plots.
2. Three plots will be used to make up one study. One plot (labeled A) will not have any rock dust in it. This is the control. The second plot (A1) will have one pound of rock dust per square yard (2.5 tons/acre). The third plot (A10) will have 10 pounds per sq. yd. (25 tons per acre). The goal is to see whether a small amount or a large amount of rock dust gives better results as compared to the controls.

You may do as many studies (each using 3 plots) as you want. To decide where the plots in each study will go, write each study plot label on individual small pieces of paper (e.g., A, A1, A10, B, B1, B10, and C, C1, C10 if you are doing three studies), and put them in a hat. Draw out each study plot label and place it on a plot map you have made of your garden or field. For a three study experiment, the plot placement could look like this:

C1	A	B10
A10	B1	C
B	C10	A10

Mark the placement on your map. Then label stakes with plot names and place inside actual plots.

3. Each person should plant one study with *Imperator* carrots – that is three plots. Each plot should have the same number of carrot plants. If three plots of carrots is simply too many, you may mix crops within plots to achieve this. For example, each of your plots could have tomatoes, carrots, celery and lettuce. Each plot should be planted with an identical configuration with the same number of tomato, carrot, celery and lettuce plants from plot to plot. The reason we are requiring everyone to plant *Imperator* is that in order to form a statistical base, everyone needs to be planting the same species. It is not possible to compare tomatoes, for example, with carrots. This way we can combine the results of many researchers and create a strong position with our data base.

Besides the carrot study, you may plant other studies with other vegetables. This information will provide valuable data about how rock dust works with various species. Please keep careful records of each vegetable in each plot on the sheets provided. The same rules apply to other studies as to the *Imperator* carrot study. One or an identical mix of crops should go in each of three plots.
4. You will have to decide if you want to use just one kind of rock dust or a mix. Gneiss is considered to be the best kind of rock, but I am not sure about its availability. Basalt and granite are also considered to be good. Bob Cannard uses crushed river rock. You may mix several kinds together, but write down how much you used and whether you measured by volume or by weight (e.g., 50% gneiss, 50% basalt weight). Please save a sample of each kind for later analysis, and mail to ***Stephanie Bierman, 2512 Ninth St., #17, Berkeley, CA 94710.*** Label samples with your name, and location, and where you got them. If you know the kind of rock, indicate that also.
5. Depending on the size of each plot, you will need to compute the amount of rock dust for each plot. Here is a sample of some sizes:

Plot Size	1lb/sq yd	10lb/sq yd
5' x 5'	2 lbs 12 oz	27 lbs 13 oz
5' x 6'	3 lbs 5 oz	33 lbs 2 oz
5' x 7'	3 lbs 14 oz	38 lbs 12 oz
6' x 6'	4 lbs	40 lbs
6' x 7'	5 lbs	50 lbs

6. This experiment may be done in pots (square or round). The difficulty is figuring out how much rock dust to use. I have calculated these amounts for common pot sizes as follows:

Rnd pots	1 lb/sq yd	10 lb/sq yd
6"	1/3 oz	3 1/3 oz
8"	2/3 oz	6 2/3 oz
10"	1 oz	10 oz

Sq pots	1lb/sq yd	10lb/sq yd
1 sq ft	1 3/4 oz	1lb 1.5 oz

Keep one-third of the pots as controls, and use the rest of the pots for the two amounts of rock dust. Everything else is the same.
7. To weigh out the rock dust, it is best to have a suitable kitchen scale. First get some small paper bags, the rock dust and stand yourself on the bathroom scale. While on the scale, hold a bag and scoop the rock dust into the bag until the desired amount is added to your weight. (This technique is necessary because bathroom scales are inaccurate at low weights. You could also use a postal scale for the smaller amount of rock dust.) Please record the total amount of rock dust you used on each plot in lbs. An alternate method would be to measure one cup of rock dust and take it to a digital scale and weigh it, thus weight could be converted to volume measures. (It is important that this measurement be extremely accurate; hence we suggest using a digital scale at a grocery store or butcher shop.)

To apply the rock dust to the various plots, take your map to your garden or field together with the bags of rock dust you have prepared. Using the map, place each bag in its correct plot, and use the map afterwards to double-check. Then sprinkle the rock dust as evenly as possible over the surface of one plot. Till it lightly under so that the wind doesn't blow it into your controls and invalidate your results. Repeat the process until all the plots are done. **Do not apply rock dust on a windy day.** Manure may also be added at this point, but be sure to apply manure to controls as well. Manure can be tilled under with the rock dust.
9. Record what you planted on the garden map.
10. Rock should be either crushed river rock, granite, basalt, gneiss or a mix of any of the above.

Note: It is best if you do tests in only part of your garden before placing it over the entire space. Not all rock dust produces good results. Once you know it works, then you can use it everywhere. *Also, if you think you might want to continue next year, be sure to mark where your rock dust plots have been over the winter.*

How To Set Up Experimental Plots

1. Decide which part of the garden or field will be for experiments.
2. Level ground is required. Make plots level if need be.
3. Cultivate and prepare soil as you would normally.
4. With a tape measure or a yardstick, measure out a square or rectangular area and mark the corners with stakes or stones.
5. Evenly divide the sides into plots and insert stakes or mark with stones. Rock dust plots should be at least 5' on a side. If they are too small, rock dust may leach into controls and may invalidate results.
All plots must be the same size.
Footpaths may be placed within plots if need be.
After you have placed the stakes, then tie string between the stakes to form plots.
Alternately, stones can be placed where the lines cross to mark plots.

Please write to Stephanie Bierman and she will send you <u>all</u> of the recording charts.

Recommendations for Testing Powdered Stone

by Mark Williams

Since the minerals in stones and gravels must first be "digested" by microbes before the minerals can be used by higher plants and animals, and since the microbes require a suitable environment in which to do their work, it can take a considerable amount of time to get the desired results from the mineralizing of soils. The time required can be minimized if the favored conditions are deliberately created for the microbes and their co-workers, the earthworms.

To get a good idea of what a particular powdered gravel will do in the long run, it may be necessary to take several steps to insure that the powder gets thoroughly activated or digested before the actual test crop is planted. In such a test, using pots or small plots, the following suggestions might insure a useful final result.

Preliminaries

Choose a soil that has had little or no chemical application, which might inhibit the microbes, unless it is desired to know what the powdered gravel will do for a particular soil. Don't sterilize the soil. A silty loam would be best.

Choose a soil that is high in organic matter, or add peat, charcoal, leaf mold, or whatever, to all pots or plots, including the control. If a cover crop is grown first, as recommended later, this is less important. If carbon is not present, the microbes must slowly get it from the air.

If a test of general growth patterns is the main interest, choose a plant like corn or sunflowers, which grow upright and the differences are easier to see. For a quick test of an edible crop, leaf lettuce might be a good choice, or radishes or carrots (quick maturing varieties).

Use no hybrids, whatever the variety. For best utilization of the minerals, an old fashioned variety ("Heirloom") will probably be best. Also, a variety that produces a large likely to require a more mineralized soil than others.

Allow for at least two pots or plots, one of them mineralized, the control being treated identically except for the minerals. Additional plots or pots may be used to test different application rates.

Allow enough room in pots or plot for at least a dozen plants, with ample space between them. If they are crowded, optimum results will not be achieved. If small pots are used, use several pots for each "condition" (control, mineralized, lightly mineralized, etc.) to provide room for enough plants. If fewer plants are used, the results may not be reliable.

All water used should be reasonably good quality, not chlorinated. If chlorinated water is to be used, allow it to sit in an open tub for a few days. Add about two tablespoons of Hydrogen Peroxide (3% "antiseptic") to each gallon to provide active oxygen for microbe metabolism. Peroxide is normally present in rain, but in the last century sulfur dioxide pollution has been destroying it.

Figure on using about one pound of powdered gravel per square foot for best growth, or at least half a pound. Several plots with several rates would be best, say 1/4, 1/2 and 1 pound per square foot. The powder should, preferably, be fine. If sand is present, remove it by placing the sandy material in a bucket of water. Stir, allow to settle for 10 - 20 seconds or so, pour off the "milky" water into another container and allow to settle overnight. Pour off the water and recover and dry the sediment in the bottom.

Pre-Activation

If quick, reliable results are desired, it is probably wise to pre-activate the dust. To do so without adding additional minerals to it, try the following: Inoculate the powdered gravel with a small amount of topsoil, then prepare a solution consisting of 85% water and 15% corn syrup to each quart of this solution. Slowly mix the solution into the dust, enough so the mixture is like moist, but not soggy, garden soil. Add more dry powder if it is too wet. The glucose syrup will provide energy and available carbon for the microbes. Be sure to add an equal amount of syrup/water mix to each pot or plot, including controls, to equalize the conditions.

After mixing the dust and sugar water together, store in a jar with a loose or perforated lid to allow oxygen in. Periodically, a couple of times a day, "tumble" the container to insure good aeration. Continue this "activation" process for a few days, preferably a week. Store the jar in the dark to prevent algae from growing (which would not be occurring in the control). This process is an attempt to simulate quickly what happens when powdered rock is placed in soils, and the plants feed sugars to the microbes surrounding their roots to stimulate the multiplication of the microbes and their "rock eating" habits.

Setting Up the Test

A location with full sun is desirable. Make sure the soil is warm - at least 70 degrees, preferably 80 degrees, Fahrenheit (21 - 27 degrees Celsius), so the microbes will be very active.

Moisten and thoroughly mix the soil to be used in all pots or plots. Add the powdered gravel, (moistening it if it was not pre-activated as above) to the portion of the soil to be mineralized, leaving the rest "plain" for the controls. Thoroughly but gently blend dust and soil together. Fill the pots or plots, labeled appropriately. Add brown and red earthworms, an equal number in each pot or plot. Level the soil and add a thin protective mulch (1/3" of chopped weeds, leaves or hay). Do not water for a few days. This allows time for the microbes to glue the soil particles into place, prevent-venting unnecessary collapse later, which would restrict the amount of air penetrating the soil.

Mark Williams has been working on the creation of small and medium sized rock grinders including a mobile grinder, and is a source of gravel dust through his New Earth Products

Preferably, a cover crop such as rye or wheat, combined with a sweet clover or something similar, should be planted first in all the plots. Pre-soak the cover crop seed overnight, and seed the plots evenly under the mulch with the same number of seeds per square foot. The cover crop should be allowed to grow for at least two weeks, but a month or two would be better. The cover crop not only provides an opportunity for the microbes to eat on the dust before the actual test crop is planted, but the cover crop plants will provide the microbes with sugar fuel through the roots. When the cover crop is to be terminated, cut it right below the soil surface, and then, after a little mincing, spread the tops over the soil surface along with a sprinkling of powdered gravel (except in the control plot), about 2 - 3 ounces per square foot. This will provide food for the earthworms. They eat dead vegetation and gravel dust, mixed together, which they grind into a fine paste which in turn "blooms" with billions of microbes, resulting in castings which are excellent plant food.

Planting the Test Crop

After resting the soil for a few days to a week or more, pre-soak and then plant, under the mulch, the final crop seeds of whatever variety has been chosen.

When the plants have been "up" for a few days, thin them to an even stand of average-sized seedlings, say, a dozen in each plot. This gets all the plots off to an even start.

Water each plot equally and evenly, as needed, with water (prepared as described earlier).

Record appropriate observations at least every week: growth, insect problems, color, etc.

Finally:

When the test has run its course, do as much of the following when comparing the mineralized plots to the control plots:

Note the coloration, average size of leaves, insect problems, etc. Don't use any pesticides on any plot.

Uproot and weigh the entire collection of plants from each plot, including fine roots and leaves. Compare between plots.

Separate and weigh the fine roots, not including tubers, etc. Compare between plots.

Separate and weigh the leaves from each plot. Compare.

Weigh just the edible portion from each plot. Compare.

Take BRIX (sugar) readings of the plant juices (preferably periodically, but at least at the end of test period) as a good general health indicator. Test the edible portion separately, if desired.

Do a "taste test" of the edible portions for texture, flavor, sweetness.

Analyze for protein, key vitamins, etc.

Carefully burn the total biomass from each plot and weigh the ashes, as an indicator of overall mineral uptake. This is very important.

Calculate the ash content as a percentage of the "live weight" from each plot. Compare the weights. This is an important indicator of overall nutritional value.

Whatever else (such as subjecting some of the plants to extreme cold). I had some leaf lettuce seedling this December which went through a minus 3 degree F night, froze solid, and when thawed, kept growing and showed no sign of any frost damage whatsoever.

Mark Williams
New Earth Products
Route 1
Horatio, AR 71842

Editor: Please send us your results!

ERS *continued from page 30*

through a central source, the United Nations, for summation and determination of future work, for technical, personnel and financial cooperation among nations.

The time is ever more critical to reallocate military expenditures to employment and investment in soil, forest, ocean, conservation and alternative energy technology programs. And how can we do this unless at the same time people have the basic everyday necessities of life?

We consider that climate stabilization is still within the realm of possibility for joint action by citizen groups in the United States through our levels of government in cooperation with the United Nations, and in joint operations with all peoples in the world."

"This letter follows from the material we sent to many of you, including U.N. delegations on October 28, 1990 with (1) a four page summary of the soil, forest, CO2, ocean, clouds, snow and ice conditions determining rapid climate change, (2) the proposed "Emergency Climate Stabilization and Earth Regeneraction Act of 1990" placed in the U.S. Congressional Record by Rep. Ronald V. Dellums, November 21, 1989, and (3) an outline and description of a"CO2 Budget" which is proposed for all countries as a working tool for regional planning and involvment in climate stabilization efforts, and (4) photographs of ice increase in the Antarctic since the mid-1960s.

We hope that this letter will contribute to our mutual efforts for survival."

For full text and reference documents please write to:

Earth Regeneration Society, Inc.
1442A Walnut Street #57 , Berkeley, CA 94709 (415)525-4877

See Resources page 55 for more info on the ERS

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More News on Rock Grinders

SMALL, LARGE, NEW AND USED

by J.B.

"It is important to find someone in the network who will take on the job of ordering 4 or 5 of the most promising small mills and running side-by-side operations tests on them, so that it is possible to recommend the safest, most efficient, quietest, and most easily maintained. Some companies will donate their product (possibly a used mill) for testing. Something to consider if there is someone who could and would do these kinds of tests and contact the companies for equipment."

A fair number of inquiries have brought responses. Of the large commercial rock mills, there seems to be an unlimited supply of used mills, often for relatively low cost, sometimes for less than some of the small mills.

Enclosed is a list of small *new* rock mills. Included are a few used big mills as examples, but if anyone wants more suppliers, please contact the newsletter for a list of all who have responded.

Of 150 inquiries there have been about 50 replies, many referring to other sources.

The only mill that uses John Hamaker's rock-on-rock grinding principle is the "Barmac," made in New Zealand. It is available here in the U.S. The only information so far is that they will lease a "Barmac" mill for $9,500.00 per month, so it may be costly.

Many of the mills listed have easily adjustable and/or replaceable "wear plates" and for home gardeners, give quite a choice for a reasonable price. It is important to find someone in the network who will take on the job of ordering 4 or 5 of the most promising small mills and running side-by-side operations tests on them, so that it is possible to recommend the safest, most efficient, quietest, and most easily maintained. Some companies will donate their product (possibly a used mill) for testing. Something to consider if there is someone who could and would do these kinds of tests and contact the companies for equipment.

List of Rock Mills (New)

Pro-Mack Mining Supplies South, Inc., 940 W. Apache Trail, Apache Junction, AZ 85220, Ph. 602-983-3484. *"Professional Lab Impact Mill,"* feed material to 3/4" dia, 1 hp, produces 100#/hr to 400-600 mesh. Price $495.00.

S. Tutenroth Milling & Mfg., Inc., Rt. 4, Box 71 D, Casa Grande, AZ 85222, Ph. 602-836-5568. Produces 2 ton/hr, 14 hp, $3,900.00; 4/ton/hr, 18 hp, $6,100.00; 6 ton/hr, 32 hp, $7,500.00. Runs material wet; engine not furnished; wear parts easily replaceable.

Dynamic Technologies Corp., 2300 South 3600 West, Salt Lake City, UT 84119, Ph. 801-972-0991. *"Supercollider"* impact mill, grinds 2" rock to 200 mesh in one pass. Produces 4200#/hr, 12 hp (engine included), machine wt. 400#, price not listed.

Luck Stevens, P.O. Box 476, Leber, CA 93243, Ph. 805-248-6742. *"Hihard Ore Pulverizer,"* 1/3 hp, 50#/hr, Price $375.00. plus many others. Hand-operated mill, 5#/hr, price $175.00.

D.M. Specialty Co., P.O. Box 1911-89, 20571 Santa Lucia, Tehachapi, CA 93561, tel. (805) 822-8078.

"Weekender Green Machine" produces 1/2 ton/hr, 4"x12" jaw crusher, with 3" hammer mill, machine wt. 700#, 5-8 hp, price, $4,200.00.

"#1 Green Machine" produces 1 to 2 tons/hr, 6"x12" jaw crusher with 4" hammer mill, machine wt. 1,000#, 12.5-18 hp, price $10,000.00.

"#2 Green Machine" produces 2-4 tons/hr, 8"x12" jaw crusher with 6" hammer mill, machine wt. 1,500#, 27 hp, price $19,000.00.

"Green Machine Mighty Mill" produces 408 tons/hr, 12"x18" jaw crusher with 10" hammer mill, machine wt. 3,200#, 41 hp, price $38,000.00. Powered with gas or diesel engine or electric motor. Mill output can be 200 mesh.

Links Mfg., Laboratory and Mining Equip., P.O. Box 3145, Landers, CA 92285-0145, tel. (619) 364 2442. They have 10" Impact Mills w/ 81/2 H.P. gas engines- $2,295. Also: 16" Impact Mills with 3 phase, 20 h.p. motor for $3,895 gas or diesel engine drive. Also rock crushers, etc.

Rock Mills (Used)

Many listed in **"California Mining Journal,"** P.O. Box 2260, Aptos, CA 95001, $14.00/yr, sample $2.00.Example: 31"x42" ball mill w/ motor, $5,500.00. Example: 6 ton/hr impact mill. Example: Hammer mill w/ 5 hp motor, $1,350.00.

H.L. Leabo Co, Inc., 231 N. 7th St., Sacramento, CA 95814, Ph. 916-442-5308. Used 1'8" cone crusher, $10,500.00. Used 10'x36' jaw crusher, $19,950.00. Plus much more.

Landau Development Co., Inc., P.O. Box 1725, Palm Springs, CA 92263, Ph. 619-324-7392.
Used 12'x20' rock crusher with 24"x38" impact mill & separator, all for $14,000.00.

Walt Thorne, P.O. Box 629, LA Center, WA 98629, Ph 206-225-5909, 5"x9" ball mill, w/ 300 hp elect. motor, 5 tons/hr to 200 mesh, 2 avail., $25,000.00, $35,000.00.

Why We Recommend 200 Mesh Fine Rock Dust

FOR SOIL REMINERALIZATION

My old friend "Doc" Earl was "magic" about 200 mesh rock dust *and* why he got very limited results with the 20 tons of 1" diameter rock he dug into his garden.

So we calculated the volume and surface area of a 1" rock *and* the total surface area of all the smaller size rocks that were of equivalent volume to the volume of the 1" rock, using these formulas:

$$\text{Volume of a Sphere} = \frac{\Pi \times \text{Diameter}^3}{6}$$

$$\text{Surface area of a Sphere} = \Pi \times \text{Diameter}^2$$

The equivalent surface area of 20 tons of 1" diameter rock came out

40,000 # of 1" diameter rock
5,000 # of 1/8" diameter rock
2500 # of 1/16" diameter rock
1250 # of 1/32" diameter rock
58 # of 400 mesh (.0015") diameter rock
32 # of 600 mesh (.0008") diameter rock

Since the soil organisms need to have access to the surface of the rock to "mine" (eat) the minerals from the rock and provide them to the plant roots, the number of soil organisms is directly proportional to the total surface area available to them.

There is also to be taken into consideration how long the soil organisms can "mine" (eat) from each size of rock partial before it is totally consumed.

This will be directly proportional to the diameter (size) of the partial. So, if...

600 mesh dust lasts 3 months
400 mesh dust lasts 6 months
200 mesh dust lasts 1 year
1/32" dia., rock lasts 12 years
1/16" dia., rock lasts 24 years
1/8" dia., rock lasts 48 years...

then rock dust will last for at least 3 months in any particular situation, since there will be many variables that affect the rate, but the point seems to me that using a good proportion of rock dust of 200 mesh or finer will give immediate food for the soil organisms and some lesser but longer acting food is available from any larger rock dust available.

So, if you have mixed rock dust available, use it. There is nothing "magic" about 200 mesh dust. By screening your "pot test" dust samples to 200 mesh, you will get a more nearly comparable test. Also, having a 200 mesh, and possibly other mesh size sieves, will let you determine the variation in sizes in any available rock test you might be considering.

J.B.

Snowball Plea *con't from pg 11*

extensive *Snowballing* programmes, copying the cassette and its papers. Mark Tripp of Oregon, U.S.A. has assiduously Snowballed in the United States on a wide scale, and so has Commander Pieter Siegers in Holland and the friends who have carried out the translations voluntarily and are working in different countries for their circulation.

Last, but not least, thank you to Gail Perry and Janet Weatherburn who carried on Snowballing during the four months I was away, and especially to Janet, who since my return has been a tower of strength working with me and taking over some aspects of the work totally. I am deeply grateful to her for her untiring help and to all who are still keeping the Snowball Snowballing.

Betsan Coats

P.S. Since writing this report we have had a wonderful response from Dr. Franklin Chang Dias from NASA thanking us for the *Plea* andpapers, and sending us a coloured portrait of himself and of many views from Space. We are sending him the Spanish translation in script form, which should be helpful. We have also had a "letter of appreciation" in response to the *Plea* from Okposi Okwu of Nigeria. He explains that he has been playing the tape to "many enthusiastic listeners who immediately gave their unreserved support". He writes that it is "a sort of bait which attracts fishes of all kinds". We have sent him three more cassettes and some scripts as he has no means of duplicating them and wishes to organize groups of listeners. We have also now heard from Roumania.

Contact Betsan Coats or Remineralize the Earth for a list of international Hamaker Coordinators.

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International Gravel and Rock Dust Sources

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If you live in one of these states you can help us contact gravel sources in your state to determine whether they would be likely sources of gravel dust:

MI, MN, MT, UT, NV, CO, NJ, PA, MD, NY, DE, AL, MS, FL, AZ, NM, IA, KS, NE, ND, SD, SC, NC, GA, VA, MA, NH, VT, ME, CT, RI, CA, OR, and Ontario, Canada.

For a list of gravel sources in your state (one of the above), send a SASE (Large manila envelope with 65 cent stamp) to David H. Miller, Department of Biology, Kettering 103 Oberlin College, Oberlin, OH 44074-1082.

MINERAL HEALTH SUPPLEMENTS

Boddy Toddy
Rockland Corporation
Tulsa, OK 74128
(918) 437-7310
(800) 331-3659

For **NOVITT** mineral health supplement from a mine in Poland disscovered by Prof. Jan Nowacki call 1-800-522 4279. Looks interesting, rather expensive.

Sacred Spring Marketing
P.O. Box 1226
Park City, UT 84060
(801)649-0322
Clark's Formulas.

See Elemite for former Azomite product which may be soon available again as a supplement. Super Blue Green algae from Cell Tech Inc., Klamath Falls, OR and KM are excellent mineral supplements based on plant sources. Super blue-green algae comes from a remineralized glacier fed lake. Also, **see** Maine Seaweed.

FOR AGRICULTURE AND FORESTS

Blue Mount Quarry
17701 Big Falls Road
Whitehall, MD 21161
Dept S.O.L.
(301) 343-0500
Earthfood Rock Dust and Rock Dust/Compost Mix.

Brookside Farms Lab
for mineral analysis only
Director Mark Flock
308 S Main St
New Knoxville, OH 45871

Clodbuster- Fertimax
Leland Taylor
701 Madison St N.E.
Alburquerque, NM 87110

Davidson Mineral Properties
Gene Rice, Inside Sales
P.O. Box 468
Lithonia, GA 30058
(404)482 7231
This is the granite quarry, the dust by-product of which was formerly sifted to become the product Hybro-tite.

Dr. Soils Glacial Jon Biloon
Box 891
Captain Cook, HI 96704

Earth Circle
P.O. Box 6123
Littleton, CO 80121
(303) 850-0689
Earth Circle is a grassroots group in Denver which is dedicated to getting the word out on rock dust. We have purchased (on consignment) a large quantity of rock dust in 50# bags from a local supplier. (U.S. Soil)

Ele-M-ite
Kelly Park
8790 Blue Jay Lane
Salt Lake City, UT 84121
(801) 278-5328
for agriculture and health supplement- Azomite

Be Evergreen
P.O. Box 7101
Carmel, CA 93921
(408) 624 1433
A gravel source for your houseplants and flower pots. Will send 3 lb packages for $3.00 plus shipping (C.O.D.).

Henry Fleischman
36 Union St
Guilford, CT 06437
Contact person for the Connecticut area

Flora-Stim
Strite's Warehouse
P.O. Box 128
Greencastle, PA 17225
(717) 597-3325

Robert Gephardt
Itasca Community College
1851 E. Highway 169
Grand Rapids, MI 55744
(218) 327-4460

Kingston Traprock Co.
Dept. 1
Kingston, NJ
Dia-King diabase rock powder. Write for info.

Laurence Lynch Co
Falmouth, MA 02540

Maine Seaweed Co.
P.O. Box 57
Steuben, ME 04680
(207) 564-2875
Sea vegetables and garden fertilizer.

Michigan Aggregates Corp
996 East Chicago Rd
Jerome, MI 49249
(517) 688 4414
This source is recommended by The Society For An Extended Ethic.

Mt. Ark Trading Co.
Fayetteville, AR 72701
1-800-643-8908
50lb bag Organic NUTRA-EARTH (ELX Rock dust) Item 10045. $29.00 + shipping.

The Notch (Lane and Son)
Rte 116
Amherst, MA
A source of traprock, very fine (3-400 mesh) basalt that may be similar to San-Vita product in Austria used for regenerating forest in Brixlegg. Also recommended for sugar maples.Used and recommended by editor, ideally in combination with glacial mix. Must wear mask if applied dry! Another larger quarry with traprock located in Westfield and glacial til (contains some loam, but mainly rock dust) in Northfield. Only available wet.

Pacific Rim Soil Additives Unlimited
P.O. Box 60183
Fairbanks, AK 99706
(907) 479-8941

Peak Minerals-Azomite Inc.
101 N Tejon, Suite 200
Colorado Springs, CO 80903
(719) 635 8000

Rado Rock
Yvonne Rado
P.O. Box 278
McKenna, WA 98558
(206) 458 4188
Newly formed company for California, Oregon, Washington and the Western States for sources of gravel dust.

Judy Roylance
Planter's II
Trace Mineral Fertilizer
Rt. 1 Box 1398, Dogwood St
Sag Harbor, NY 11963
(516) 725 1009

Tilcon Massachusetts, Inc.
attn: Tim Kelly
72 Main St. P.O. Box 114
Acushnet, MA 02743
Called clarifier material. 3.4% going through 200 mesh. Desc: Metamorphic rock; dark green to black to white chlorite-biotite schistose gneiss; derivative of an original quartz-felspathic material.

Trace Minerals Marketing
Organic Life Soil Minerals
300 Fremont #113
Las Vegas, NV 89101

Peaceful Valley Farm Supply
11173 Peaceful Valley Rd
Nevada City, CA 95959
(916) 265 FARM

U.S. Soil
7595 W. HWY 50
Salida, CO 81201
(719)539-6611
Fax (719)539-4936
East coast distributor:
Tom Whitesell
Star Route, Box 165A
Canton, NY 13617

Mark Williams
New Earth Products
Route One, Horatio AR
71842
(501) 832-2444
50 lb bags are also available.

Vulcan Materials Co
We have not confirmed the quality of the sources listed.
Edmund Redd
P. O. Drawer 1590
Manassas, VA 22110
(703) 631 2060
Various rock sources.

Mickey R Love
P O Box 4195
Winston-Salem, NC 27105
(919) 767 4600

J Lloyd Sentell
P O Box 7
Knoxville, TN 37901-6001
(615) 579 2903

John T Douglas
500 West Plainfield Rd
Countryside, IL 60525
(312) 482 7000

Dick Bade
1127 South Chicago Street
Joliet, IL 60436
(815) 726 5285

Daniel Roadruck
P O Box 5529
West Lafayette, IN 47906
(317) 743 2175

W Max Stephens
P O Box 80730
Atlanta, GA 30366
(404) 458 4481

Hal C Stokes
P O Drawer 8834
Greenville, SC 29604
(803) 2772371

Alan C Stanfield
P O Box 7324-A
Birmingham, AL 35253
(205) 877 3642

Pat D Kerry
P O Box 29310
San Antonio, TX 78229

Australia

Australian Mineral Fertilizer
Hendon Industrial Park
113 Tapleys Hill Rd
Hendon 5014
Western Australia

Natural Mineral Fertilizer
Norm Todkill
21 Blackwood Ave
Morningside 4170
Brisbane tel 07 399 1230

Austria

Bioglück
A-3950 Wielands
tel 02852 2414

Diabaswerk
A-5760 Saalfelden
tel 06582 2373

Firma Diwoky
Frachtenbahnhof Gersthof
A-1180 Vienna tel 472241

Firma Gleichenteil
Gleichentheilgasse
A-1230 Vienna
tel 672193, 672194

Kärnter Basalt
Kampach, St. Paul
Lavanthal

Konrad Planegger Diabas Werk
A-9134 Launsdorf
tel 04213 2044

Sanvita Hartsteinwerk Kitzbühel
Attn: Mr. Abermann
Postfach 44
A-6370 Kitzbühel
tel 05356-4333-0

Robert Schindele Furnierwerk
Kicking 18
A-3122 Gansbach
Superbiomin

France

Societe de Carrieros de St. Nabor
67530 Ottrot
St. Nabor
tel 88958114

Germany

Basalt Vertriebgesellschaft mbH and Co KG
Südniedersachsen
Bramburg,
D-3404 Adelebsen

Basaltwerk Wiesau/Opf.
250 Maclellan Bldg.
Triebendorf

Firma Ernst Otto Cohrs
Postfach 1165
D-2720 Rotemburg/
Wumme**Firma Hauri KG**
D-7805 Botzingen/
Kaiserstuhl

Lava-Union
D-5485 Sinzig/Rhein
Kölner Str.22
Tel: 02642-4010

Porphyrwerke Weinheim
Shriesheim AG
Postfach 1609
D06900 Weinheim

Schotterwerk
D-7613 Hausach/ Hechtsberg

Switzerland

Bertrand Rime
1751 Middes
Fribourg
tel 037 681335

Bioticino
V. Gautschin, V C Molo 1
6500 Bellinzona, Tessen
tel 092 262 984

Firma Otto Gamma AG
Seestrasse 336
8038 Zurich
tel 02 832765

Johann Wenger
Muller Poffetmuhle
1717 St. Ursen
Fribourg tel 037441173

Maurice Schillinger
Garten Center, Rte Suisse
1196 Glant, Vaud
tel 022 642267

Wytor SA
1628 Vuadens, Fribourg
tel 029 28280

Zimmerli Mineralwerk AG
Hohlstrasse 500
8048 Zurich
Tel 01/432 10 40

United Kingdom

List of 80 quarries in U.K.
Redland Aggregates Ltd
David Langley
Technical Manager
Bradgate House, Groby
Leics. LE60FA

College of Soil Research
Eileen Moore
5 Chase Side Place, Enfield
Middx. EN2 6QA
tel: 01 363 8615
Sells several kinds of rock dust for agriculture and Austrian Superbiomin mineral powder for internal use.

Rock Dust-Remineralize the Earth

Bumper stickers

A beautiful sky blue and white background with a green tree in the middle. They cost $2.00 each retail, and 75 cents each for large purchases (50 or more), for fundraising for your group. Make check out to:

Earth Circle, P O Box 150753, Lakewood, CO 80215, (303) 988-4359.

Editor: These bumperstickers are really beautiful and I recommend ordering them for yourself and friends!

People For A Future

To order the video ***Stopping The Coming Ice Age***. ($32.95 ppd). CA residents add state tax.

People For a Future
2140 Shattuck Ave.
Berkeley, CA 94704
Dial 1-800-441-7707 or (415) 524-2700 in California

Hamaker Weaver Publishers

To order the book
The Survival of Civilization
($12.00 ppd.)
The Solar or Ice Age? Bulletin #10 (366 pg.)
Suggested minimum donation $10.00. CA residents add state tax.
Hamaker Weaver Publishers
P.O. Box 1961
Burlingame, CA 94010
(415) 347-9693

Rocker Box Wear

My problem is one I anticipate, regarding the wear of the rocker box (as designed by J. Hamaker). Where the fixed side plates that hold the box together come in contact with the rocks inside, can you expect to have very much wear? I'm puzzling with the idea of wear plates covering the whole inside of the fixed plates, but wiill these wear down fast? Can I use 1/8" steel and not worry about replacing them, or do I go for something bigger and more expensive? As I have not finished my grinder, I would appreciate anyone's experiences of the same problem.

Warren Pearce
Taradale
Napier, New Zealand

John Hamaker Replies...

If I understand correctly, Warren Pearce is attempting to build a grinder like I built. I would not wish that one on my worst enemy. It did the two things I hoped it would; it made possible motion through a deep layer of gravel, and it was low cost. I had hoped that the wearing surfaces would "wear themselves in". Such was not the case. Instead, wherever the dust found a place to get past the moving plate, the wear concentrated in that place and soon became a bad leak. That meant that the grinder was impractical for use on the farm.

At that point, I abandoned the idea of putting gravel in one end and taking dust out the other end.

On page 9 of **SR** (Summer 1988) is described a rocker box grinder which is virtually wear proof. Both the Rotary grinder which I patented (now expired) and the rocker box can be fitted with boots to employ the reverse flow principle to give us efficient wear-free grinders. The output will then consist of water-suspendable particle size.

Whether we are talking about the milky -colored water of a glacial stream used by the people of Hunza to irrigate their crops, or the tens of millions of years when cataclysmic explosions followed the breakup of Pangea, or the climatic optimum after the 90,000 years of glaciation, the thing that assured strong vigorous growth has been the presence of water-suspendable particles in the soil. The great surface area of such particles provided the minerals to support an abundance of the microorganisms which produce the life compounds for all other life.

Nature has demonstrated what is required. I can not recommend too strongly that those who can build the grinders we need do so.

John Hamaker

New Name for SR?

Thank you for the wonderful current issue! It is some time since I made contact and thanked you for the ongoing, updating and inspiration of your Newsletter. **Soil Remineralization**! What a beautiful, practical, positive, implementable and understandable title!

There are hundreds of organizations/groups with various "handles", each expressing recently-realized concern for Earth, Life, survival, etc., but is there one which suggests in two words, a solution, hope, action and success?

I would be sorry to see the name changed, being the notion which has brought it thus far (Soil Remineralization, that is). However, if, with new staff, a new name *must* be chosen, please don't abandon the practical and active implications of the Networking. Unless, of course, you are changing policy to become another environmental movement - albeit an excellent move, but possibly non-specific in its target.

Some locals put their bit in:
Global Action for Soil Survival (GASS)
Rock-Dust Reachout
Soil Remineralizing Network
The Rock Dusters' Companion

Joy Wilton-Hill
Armidale, NSW, Australia

Now Or Never For Remineralization in Costa Rica

Now, here comes some news again, and from what you will gather, with such major issues and priority with the new Government, we must now achieve what we want [for remineralization]. It's now or never, and Costa Rica will play its role.

Edmundo Kandler
Hamaker Coordination
San Jose, Costa Rica

Here is a copy of a letter sent to the **World Wide Fund for Nature** in Switzerland:

To Miss Monica Ranchandani
WWF - CH 1196 Gland, Switzerland

Included some material about the coming ice age and remineralization. Remineralization is being applied to dying forests and also agricultural land in Switzerland, Austria, Germany, Canada, USA, New Zealand and Australia, with wonderful results.

I have two friends in Uruguay experimenting with rock dust, and I'm also applying it on my farm, where I have been growing vegetables (organic) for some years. As I have just started with rock dust, we shall have to wait about 6 months for results.

Mauricio Waroquiers
Macrobiotico De Maldonado
Sarandi 672, C.P.20000
Maldonado, Uruguay

From New Zealand

Betsan Coats tells me that an Australian branch has been set up to study rock dust and their effects. They have given it the name of "Agrogeology" which seems to me most suitable. So we now have Agrogeology, Petrological Permutations, and Soil Remineralization. Betsan and I will be exchanging notes on our research and I hope we will all keep in touch with one another, and hand our information on to the increasing number of people who are beginning to take an increasing interest in rock dust and its useage.

There is so much interest in rock dust amongst the members of the Soil Assn. that I am beginning to feel a bit apprehensive about keeping up with all the correspondence and queries. I have called for about 20 volunteers amongst the members who will undertake some of the trials and research with me. There is probably a lot of backyard research going on but the trouble is to get hold of it. I suppose you yourself could write a book on this subject.

Keith Gray
Rotorua, New Zealand

We are interested to exchange SR, A Network Newsletter with our **Institute for Sustainable Agriculture Nepal** Newsletter (INSAN)... and would appreciate it if you could also send us back issues, if possible, to our INSAN library.

Badri N. Dahal
Director, INSAN
Baneshwore-10, GPO Box 3033
Kathmandu, Nepal

A Plea For Materials From Cambodia

My name is Ouk Syphan. After the overthrow of Pol Pot regime in 1979, the first batch of forestry graduates came out in 1989. I happen to be one of the graduates among 30. We are now working in various places like forestry department, agriculture institute, provincial forestry bureau and so on. In 1979 after liberation from Pol Pot regime, only 3 forestry graduates survived, who are now the only experiment people to guide us. I'm now working under the Forestry Department within the Ministry of Agriculture.

Unfortunately, my country does not have forestry books, information which was destroyed during the past regime. I would very much appreciate if you would help me with regard to forestry material, books, other resources that will help me in my work, and to set up a forestry library at my department. I'm introduced to you by my teacher, M.C. Periera, who has been working in this country through a voluntary organisation, who has been assisting us in various ways, and also with regard to the postage which I cannot afford. Due to the problem of postal communication in my country, because of international isolation, I request you to kindly send material to the following address:

M.C. Pereira (Attn: Ouk Syphan)
CIDSE, P.O. Box 2420
Bangkok 10500, Thailand

Your assistance will be highly appreciated, and I assure that your help will be put to the best use, especially because we are working with very minimum support. Please include my name in your mailing list. Could you also pass my address and request to institutions, organisations, publishers and indviduals who would be of any assistance. Any material on appropriate technology and farming related materials are also welcome.

Ouk Syphan
Dept. of Forestry, Ministry of Agriculture
Phnom-Penh
State of Cambodia

Research In Canada

I am a newcomer to the soil remineralization project, but I have decided to research this concept fully. In Ontario we can apply to the Provincial Government for a grant under their Environmental Research Program. This I have done, and I am now waiting for approval. Funds would be available, if approved, by January, 1991. I have also enquired about similar grants through our Federal Ministry of the Environment. Also, I have joined forces with an explor-ation firm, Hillsboro Resources, Ltd., out of Brampton, Ontario.

We intend to explore glacial tills or residues in Ontario as part of the research program. We will also do pot or plant tests. Personally, I believe that unless the glacial deposits contain potassium or phosphorus, which is rare in Ontario, any rock remineralization will not improve growth 300-500% as claimed by John Hamaker. However, I do expect some improvement, the amount of which depends on many factors: How poor is the base soil, and how good the remineralization dust, in terms of elements.

Do you have any rock analyses for those products or users who have achieved some success in remineralization? What were the ppm. of key elements? What rates of plant improvement did they achieve in growth or yield?

I will keep you posted on our research work. I have attached analysis of some typical rock products or types of crushed rock. This may help others to comment as well.

Mr. Matt Vooro, P.Eng.
2260 Britannia Rd., RR#3
Campbellville, Ont. L0P 1B0

The article on the impact mills is very extensive and should provide the movement with a practical tool at a reasonable cost. Already Earth Day, Vancouver has been in touch. I am glad you believe in us; it makes all the work all that more worth while. David Miller's article does not corroborate any, or much of Hamaker's findings; I am not surprised. There are so many variables - soil quality, rock quality, matching appropriate rock with soil needs. The chaps at Earth Day faxed me an analysis of their rock - 70 elements or more! Mr. Miller must be encouraged and funded to complete his work.

Bruce Miller
Harvest Technologies, Inc., 331 Palmerston Blvd.,
Toronto, Ontario, Canada M6G 2N5

I'd love to find someone who has a commercial service of rock dust already bagged and ready to go. Know anywhere in Canada or USA? Where could we purchase a supply? We are interested in marketing a product on a global basis to allow more people to pick up the cause.

Bill Milne
Alex. Milne Assoc., Ltd.
376 Orenda Road East
Brampton, Ont. L6T 1G1, Canada

Dave Miller was in London last month, so I arranged for him to meet four people from different organic research stations in the U.K. We had a very pleasant evening, and hope to keep in touch with all the latest developments.

Eileen Moore
College of Soil Research
Enfield, Mddx. U.K.

Is Sand Not Ground Rock?

The orchard garden of a coastal house in Denmark was more fruitful than any garden I have seen. Yet the soil was sand! No additives at all. Is not sand ground rock? Why then not sand for your remineralisation? I am told even the Sahara only needs water to make it bloom. I have never seen such abundant apples and pears, nor such luxuriant grass, herbs and flowers. What is your answer?

John Papworth
London, England

Editor: John Hamaker has commented that it indeed has been his experience and even found tremendous growth without the addition of organic matter. In advocating it generally for addition to the soil the cost of transportation of the large quantities of sand required to give satisfactory yield will generally be prohibitive. The results you mention may indeed indicate the great value of minerals in the soil and that in areas such as the Sahara, water is all

that is needed. I hope that doesn't downplay too much the need to recycle organic matter as well, when restoring soils. We must utilize the most the earth has to offer for creating optimum soils wherever we are and return to the earth what we can.

Progress and Setbacks in India

A small letter just to inform you about the progress and setbacks we are facing in trying to get a soil remineralization process going. I got news from Don Weaver that the pebbles from the old river bed here close by are no good. I had sent him a sample.

I went to Hyderabad and met Mr. Michel Pimbert. I suppose he will send you a copy of a study and experiment done by him at ICRISAT. We will remain in close contact and see how we can proceed further.

I have tried a commercial rock powder called Upjau Khad with mixed success. It helps against insects and pest attack for sure, but the stuff is not fine enough and very costly.

Also I contacted the Institute Français here, a very reknowned institute in Asia, and gave them the cassette *(Stopping the Coming Ice Age)*. I'll contact the I.F. later and see how they are responding.

I have been sending copies of SR primer to various institutions known to me; maybe here or there someone will be touched! It does not matter where the breakthrough comes, only that it happens somewhere in India.

I found out that the dolomite powder available here has actually been mined for its magnesium content, so what remains and is available on the market is also more or less useless since most of the minerals have been removed in processing of the stuff.

I have written letters to a few enterprises dealing in rare earths and mining in general. I am enquiring what kind of waste products are available from these mining industries. Also I am still passing on information on rock dust by various NGO's working on alternatives in land use. We are organizing a workshop in December where people from all over India will participate (sustainable agriculture) and I hope to present them some programme on rock dust.

The government of Rajasthan is preparing a seminar on organic farming. They want to evaluate if organic farming would be able to replace their conventionally promoted practices. Here there is a possibility to present the work of remineralization. I'll be participating in the debate.

Bernard
Auroville, India

I have a copy of TIPSY '86 and recently was reading the article on remineralization. We've bought a new 60 acre farm in the Southwest region of France, and I'm hoping to remineralize the soil. Do you have knowledge of remineralization organisations in the area whom I could approach for assistance and possible rock dust? I do intend to look for local deposits of suitable material, although finding the small particles is a problem we all share. How important is it for the dust to be of the right mix and compatible with the soil in the farm?

My interest in soil remineralization stems from my organic/biodynamic activities in which silica sprays and preparations are applied to the crops in order to bring form and warmth to the soil. It also has the effect of making the leaves more resistant to pest attack. I've been immersed in Bill Mollison's work and the permaculture movement. With land prices in my old region in Yorkshire, England fetching £3,600 an acre, farming on my principles is not on. So we've decided to move to a place which has exciting possibilities. Besides, Britain is on the edge of breakdown. The government is in turmoil and the people here are being increasingly pressed economically.

It may be possible, at a later date, to build on my experiences so that others may benefit and see the wisdom of our actions.

I do hope that all is progressing well on your side of the Atlantic, and my very best wishes for you in all your endeavours.

Darren Wilkinson
Domain Portoi
11290 Arzens, Carcassonne, France

Here in westernmost El Salvador, a relatively peaceful part of the country at present, in our particular area it's all dry land farming, principally of hybrid corn and sorghum. We have started a self-help appropriate technology program here in an effort to get away from monocropping, introduce a diversity of vegetable crops, and try to bring ourselves and our neighbors, as farmers, above the mere subsistence level. A grant of twenty to twenty five thousand dollars would bring us a tiller to fine tune the ox plowing, community transportation for day to day chores, taking crops to market in the capitol, medical emergency help, visual aids for agricultural education in community group and school, and a start on finding ways to utilize our sometimes meager water resources on a year-round basis, but I don't know who'd be likely to give such a grant.

Don Yarbrough
La Loma Project
Apartado Postal #1
Sonsonate, El Salvador, C.A.

I think it would be wise to keep the current name for the newsletter. The content of the magazine is what makes the rock dust issue accessible to people. The title is simple, straightforward and honest - more power to those qualities.

Please send me the address of Doug McLean, "Earth Day - Canada" p.7, SR Spring 1990. I am of course interested to know more about what he is up to and perhaps give him assistance; we're in the same area of the world.

Liz Thor-Larsen
Vancouver, B.C. Canada

Yvonne Rado Writes

Glacial moraine has become my passion. A handful of moraine shows better than a thousand words what Hamaker means when he says "mixed gravel dust".

Moraine is also very pleasant to touch, remembering the grand forces of Nature that produced the gentle and polished contours of the stones.

And, moraine is beautiful to look at.

Nearly everyday I celebrate my opportunity to work with rock dust. Each of you has made major contributions to my progress. I trust your own passion for rock dust will lead you to enjoy your own mini-collection of Washington State glacial moraine.

In the Spirit of Regeneration
Yvonne Marie Rado
P.O. Box 278
McKenna, WA

Oregon Rock Dust Available

I have no intention to take advantage of people, nor am I in a position to consider distribution of dust a full-time occupation. I cannot deny the attraction of practicing such a vocation, particularly the involvement with so many wonderful conscious people. Life in the soil is, and has been, an intense concern of mine, as you've already gathered.

In consideration of many things and the recent input, I want to sell the dust I have for $5 for a 50 lb. bag. It's triple-walled paper and recycleable. I will send $1 from every bag to People for a Future.

The river rock dust here is from an asphalt plant. It gets heated up to 350°F by natural gas outside the drum, from which it is collected by a vacuum. It is not exposed to gas or asphalt fumes before or after its collection in the paper bags. Yvonne feels that some elements may be lost to this heat, and sulphur, among others, may be decreased somewhat. I don't know how important this is; people will be using different composts on varying soils. I'm merely stating what I perceive as fact to satisfy the many inquiries. If I could afford it, I too would choose straight, natural dust.

Also I learned that the combined analyses may not accurately reflect the levels of trace elements present in the dust. There may be better labs.

I still have not documented an actual pot test. A variety of indoor potted plants all exhibited positive response (new growth, blossoms) in the middle of winter, which is often very overcast here. Potting soils consisted of various combinations of clay, herbaceous compost and mineral dusts, primarily lime and gypsum. The same plants exhibited either no response or adverse response when treated with crushed basalt recently. I expect an analysis, when affordable, will offer some interesting comparisons.

So, I just want to make this dust available to any interested parties. I feel assured that the material is "safe", and results will depend upon compost, soils and the unseen characteristics, (i.e., plant nutrient quality), which few of us have the means to determine at this time. The lime will remain at $3 per 50 lb. bag. I hope to approach *CRC* at some future date to urge them to make their material more accessible, if possible. Lime here, at present, seems to be a necessary component in any exterior soil application.

Yvonne, I feel, is doing a beautiful job of qualifying her material, and I have nothing but admiration for her standards and principles. I have no doubt that she will be offering dust of a superior standard, and I would urge people to purchase her materials.

Jim Alexander
Micro Organic Management Systems
P.O. Box 1611
Clackamas, OR 97015
(503)659-3723 or 222-7282

Radio and Videotape Interviews With John Hamaker

Saw your publication last weekend at John Hamaker's. Hadn't seen him since he passed through this area when he was moving down from Michigan. I taped an interview with him then, and have aired this a few times over my local radio show. It's on KOPN radio, community supported non-NPR related (which is fine by me as they have yet to produce any tape on the book ***The Survival of Civilization*** format; perhaps they haven't been approached enough?) Anyway, I am interested in obtaining a subscription to your publication and wishing for a few back copies, especially Vol. III, #10 which has the revised crusher plans. We are forming a local group that is interested in developing a crusher/grinder.

I also videotaped an hour long interview with John when I was there. They are both such a loving and compassionate pair*(referring to John and Anita Hamaker).* I may be able to get this reproduced for distribution through your journal if you think others may be interested.

David Mars
P.O. Box 11
Ashland, MO 65010

On Liming Lakes, And The Need To Improve The Process With Rock Dust

Editor: This letter refers to an article reporting on chemical neutralization of acidified waters by aerial spreading of ground or pelletized limestone. Liming has been done in Europe for 60 years, but although it increases pH dramatically, the results are short-lived in lakes and streams. Treated waters are flushed out in a year or two and replaced by untreated, acid water. Harvey Olem, a Washington, DC consultant, has proposed liming of forested watershed areas, which will buffer the water source slowly and uniformly, prevent pockets of extreme acidity and toxic overbuffering and last five to ten years instead of one or two per treatment.

In the first U.S. test in October 1989, helicopters dropped 1,000 metric tons of limestone pellets on the watershed slopes above streams feeding Woods Lake in the Adirondacks of NY State. The project will be monitored for a variety of ecological effects over the next two years.

We missed out on this one. Now that we can pelletize Glacial Flour we can compete, however, we have a mentality to overcome. We have to cover a project of this magnitude to get soil remineralization on the road. A small drainage system (Bioregion) with dedicated people who will apply and monitor would be ideal. We tried to swing this kind of a deal in the Pacific Basin, but that's a few years down the line yet.

At the moment we are negotiating with a firm that is treating tailing piles in the Colorado Rockies. Their lab tests were positive enough to warrant negotiating delivery of 20 ton of Glacial Flour. We have a fair deal on return hauls of highway freighters out of Alaska. We'll know by midsummer if we are competitive. Drying and packaging turns out to be our highest cost to overcome. Also, I learned that the combined analyses may not "Olem" on our team. I'm not knocking the liming process - just saying that each pellet should be 50% rock dust or glacial flour.

We have had good luck treating the early dieout syndrome (which in part may result from Arctic haze and the acid rain it causes) in the boreal forest in central Alaska. However, we hardly get a raised eyebrow from the entrenched petrochemical mentality.

Our gardening projects have been the most receptive to rock dust and glacial flour in Alaska. Our most spectacular results came from a 1% addition of coal dust to our glacial flour. As a fallout of our romance with glacial flour, we have learned that its health-regenerating aspects can readily be noticed in poultices, facials, mud baths, etc. The most exciting is to find that some of our turbid glacial water has the same qualities attributed to the Hunza water. We now see as much "cloudy" water in homes as bottled and distilled. So far the Health Dept. insists that all discoloration and "foreign matter" must be removed from the water be-

fore it can legally be sold! In other words, they want us to remove the very element that makes it health-regenerating. Many people who cannot get the "cloudy" water from its source are mixing a combination of glacial flour, Flanagan's Crystal Water and distilled water. Mixed by the Steiner technique, the colloidal minerals will stay in suspension for extended periods of time.

We have a request for Glacial Flour from the *Reap Society* in Edmonton, Alberta. Hopefully, we can make arrangements to drop off a container when we take our material to the Colorado Rockies Project.

Last spring we collected 26 samples of S.R. rock dust and 6 samples of river sediments. These were turned over to the Community College of Olympia, WA, staff for pot tests. Unfortunately, not enough care was taken or records kept to warrant publishing the results. However, it would appear that the best results came from basalt dust from the Columbia River Gorge deposit. The best sediment test was from the glacial stream of Mt. Baker. If we can garner enough interest, we would like to gather another set of rock dust and sediment samples for a more structured set of pot tests in 1991. So far we have interest shown from Canada to Oxaca, Mexico.

Things are moving in the remineralization field, but frustratingly slowly. The liming project at Woods Lake, NY is definitely a move in the right direction. However, until we get rock dust or glacial flour into the formula we will see only the same minimal results they have recorded in Europe for the past 60 years.

I think we should work out a concise form letter with which the SR community could bombard their elected officials, so we can get into the act and get the *real* show on the road.

Fred Pankratz
Pacific Rim Soil Additives Unlimited
P.O. Box 60183
Fairbanks, Alaska 99706
(907) 479-8941

Kudos For The Newsletter

Your latest **SR** Newsletter is another winner, very impressive. It also gives the impression of a general strengthening of the remineralization effort. One can sense the increase in momentum. The letters reflect a high-quality readership that is activist and dedicated. The research of David Miller is valuable and timely, so that users will be better prepared for varying results. Hopefully, the methodology will continue to develop so that future results will become more reliable and predictable.

I see that more sources for rock dust are becoming available. When I wrote my Trade Association article I was aware of only about a half dozen sources, but it was a pleasant surprise to see that my suggestion may be more timely than I realized.

The Yvonne Rado story was excellent and very encouraging. All the articles were great. In general the whole newsletter has a comfortable layout and it reads very well. The tone is upbeat and positive throughout, and your reader's letters evidently confirm this. I also thought that the title **Soil Remineralization** is a bit cumbersome, and I tried to think of suitable alternatives. So far I have not been able to improve on it, but I do not think it is a serious problem.

Bertram Cohen
Poughkeepsie, NY

Stephanie Bierman Needs Volunteer Experimenters- See Article Page 36

I have become aware that the means to solve the ecological crisis on earth at this time are available to us. I have come in contact with certain agricultural methods which appear to hold great promise. Out of a whole body of wondrous techniques, I have selected a few which have the distinct advantages of using local resources, are cost effective, increase the health and fertility of the soil, as well as the health, productivity, nutritional content and growth rates of the plants that grow therein. These techniques are begging to be experimented with further to refine the practical side of their application and to make them accessible to all humankind.

Already a number of farmers and gardeners from Washington, Oregon and California have volunteered for this project, and we are in the process of connecting with other growers throughout the United States.

If you are interested in participating, it is very important that you keep careful records during the season on the sheets provided. Please feel free to discuss any problems that come up, as soon as they arise. I will try to help you in any way I can.

I hope the caring you hold for the earth and for humankind will find a genuine opportunity to manifest within this project

Stephanie Bierman
2512 Ninth Street, #17
Berkeley, CA 94710
(415) 658-9649 (home)
(415) 848-6192 (office)

As soon as we are able to sell our home here in Philadelphia, we are planning to move to Uplands Retirement Village in Pleasant Hill, TN. We have an acre of land there with our house, on which I have already planted fruit and nut trees, shrubs, etc. In that area they have a special kind of sandstone called Crab Orchard stone, which I was told is found nowhere else on earth except for one area in the Soviet Union, if I remember correctly. It is used as a building stone there in Tennessee. I am wondering whether the dust from cutting this relatively soft sandstone might possibly be used for soil remineralization.

Walter Stark
338 West Logan Street
Philadelphia, PA 19144

I'm interested in getting hold of some glacial gravel dust for my personal gardening and possible nursery business. I'm also interested in selling it on a retail basis to gardeners, and perhaps distributing it to farmers in Florida and the Carribean. Any contacts you can provide will be most gratefully received.

John Bass
Miami, FL

Writing to say I'm one more SR person, digging crusher fines into soil here, still planting my garden. Two small fruit trees damaged by deer are showing excellent regrowth; dug gravel into the root area. Hoping vegetables will show similar big, fast growth. I'm learning as I go; believe I've made a few errors, trying to do a different method now.

For many years I've felt we have little time left on this planet, 'til our human destructiveness ruins all life support systems. I was very happy then, to learn of Hamaker-Weaver and ***The Survival of Civilization***, and Larry

Ephron's book and video. And now I see Congressman Ron Dellums is supposed to be offering to Congress a new bill, "Emergency Climate Stabilization and Earth Regeneration". I agree fully with John Hamaker: without a global effort directed at the priority needs he stresses, we don't seem to have a chance. I'm also interested in the World Constitution and Parliament Association as a vehicle to carry out the daily practical details of putting the Hamaker-Weaver concept into emergency activities in every country. I don't know how much power they have to overcome the many obstacles that exist. It could be an impossible goal, but if we can't do this, we'll lose all soil, air and water soon enough, as big industry, big business and big government drain and poison our planet. Of course, the general public is just as much involved, with consumerism beyond belief. There's a source of support I'm basing any hopes on; I've written to both Weaver and Hamaker about this, also Philip Isley of World Constitution and Parliament Association, and anyone else I know of who is concerned to heal our dying environment.

Do you know of the Nichiren Shoshu World Peace Organization - a Buddhist group. Although it's very hard for persons of scientific view to believe, this chanting brings forth amazing constructive energy in the material world, far beyond "power of positive thinking", self-hypnosis or such. It's solely due to the positive events and benefits of daily chanting that I have my lovely small acreage and charming old home here, all paid for, with children all grown, in good jobs, doing very well. I'm chanting now strongly for world population to follow Hamaker-Weaver concepts, with soil remineralization and reforestation - right now, so we can hope to avoid the horror of extinction amidst the mess we've made, and rebuild a beautiful world instead. Here's the address of the center in Boston: *Nichiren Shoshu Community Center*, 7 N. Harcourt St., Boston, MA 02118. (617)536-3820

Janice Bhie
Aztec, New Mexico

Have found an organic farmer in Connecticut who sells trap rock dust. Put a good amount on garden last month and then will give it more in fall. Anxious to see results of spring application.

Ann Marie McCoy
Burlington, CT

Please sign me up for **SR.** I learned about this through *Secrets of the Soil.* I have some friends in Auroville, a community in south India, interested in trying these ideas, and I am also hoping to find a source for a small quantity to put on my home garden here in L.A.

Michael Zarky
Los Angeles, CA

We live in Yelm, WA, and are very interested in using rock dust, but we do not have a source of it. I have read about Rollin Anderson and Azomite; it sounds great. Do you have information on how I can reach him, or if anyone in our area carries his product?

It is always an inspiration to hear of simple people helping the earth. That is the only hope I see for our present situation. The government has its own agenda, and it doesn't include simple solutions. Any information you have on the area I live in, south of Olympia, WA, would be helpful. Thank you for your work.

Nancy Buidenthal
PO Box 381/MU #11
Yelm, WA 98597

*Editor: See **Gravel Source list*** on page 42 *or **Letters** for Yvonne Rado of Rado Rock*

I am interested in sources, amounts to be applied and any information relating to the Ozark Plateau, woodlands and ridges, as opposed to prairie and more fertile river lowlands.

George Eberle, Jr.
1444 Sullivan
St. Louis, MO 63107

RE: a *typical* gravel mix for rock dust? What I'm tempting to identify are the kinds of rocks that are essential/usual sources of adequate proportions of minerals commonly required by most vegetables, fruits, grains and nuts. In other words, what kinds of rocks regularly provide a good "balanced diet" to soil microbes...without a soil analysis and assuming 200 mesh dust.

Scott Townsend
Tuolumne, CA

Editor: John Hamaker always refers to "nature's mix," found in glacial, river and seabed deposits. and mixed by the action of the glaciers and wind.

What examples have you run across of talcum fine gravel dusts being added to livestock rations yielding significant growth responses?

Rodney L. Edington
205 Second Street
Trenton, NJ 08611

*Editor: John Hamaker in **The Survival of Civilization** mentions a U.S. Study which showed high growth response. I have an article on dairy farming in Austria by Georg Abermann. There many farmers use rock dust with fantastic results both for production of milk, health of the cows, lack of odor in the liquid manure and the liquid manure as a superior fertilizer for the pastures. A Scandinavian study has also shown cows will always choose a remineralized pasture over an unremineralized one. In Australia, Australian Mineral Fertilizer (see **Intl Gravel Source List**) has pages of testimonials in their literature of farmers who have given the supplement to domestic farm animals, incredibly enhancing their health, especially as a cure for mastitis and so on. Peak Minerals' Azomite, a source of rock dust in Utah (see **Source** list) has also favorable studies on the growth of turkeys and chickens. This is surely another indication of how remineralization can benefit all living beings – plant, animal and human.*

If you know a source for Mr. Schindele's "Gesteinmehl", or Mr. Anderson's "Azomite" (as well as your opinion about its use on soil and in the diet), I'd sure like to hear from you. Enclosed please find a check to cover the cost of a subscription to your newsletter.

Our farm, by the way, has a beautiful stand of black walnut trees of all ages, some producing well, others not. I am noticing the effects of acid rain. There are tent caterpillars, hust worms, weak limbs, and on older trees, loose bark.

Ron Ellis
Montclair, NJ 07042

Editor: See International Gravel Sourcelist for both. For Azomite see **Elemite** or **Peak Minerals** listing page 42.

A grapevine for subscribers– to network and communicate with each other about SR

The Network

Subscribers are invited to join the listing. Please contact us so we can include you. SR= soil remineralization.

Gregory Alexander
50 Billou Street
San Rafael, CA 94901
(415) 459-1681
Building contractor, organic gardener.

Joe Alexander
PO Box 3200
Fayetteville, AR 72702
(501) 521-9027

Giselle Allison
201 Edgewood
Laporte, TX 77571
(713) 471-8278
Naturopathic student and gardener.

Darnell Ashley
5320 Arbor Vitae St., Apt. #7
Los Angeles, CA 90045
(213) 641-6227

Phil Barnette
Star Rte. 157, Cedar Creek Road
Black Mountain, NC 28711
(704) 669-2814

Jean Bartlett
919 24th Ave. #224
Tuscaloosa, AL 35401

Katharina and Kosta Becker
Diamond Health & Food Inc.
Star Route 112-1
Tijeras, NM 87059
(505) 281-8442
Double pyramid greenhouse project. Grows mineral-rich food. Interested in producing local mineral dust.

Joseph Bednarz
425 S. Plymouth Blvd.
Los Angeles, CA 90020
(213) 935-0683

Bernard
c/o Revelation Farm
Auroville 605104
India
Annapurna Farm promotes indigenous agriculture, using indigenous genetic resources and knowledge.

James Berry
15368 Mowersville Road
Shippenburg, PA 17257
(717) 423-6701
Free cement Kiln dust available for pickup.

Fletcher and Grace H. Blanchard
Box 2668
Northville, NY 12134
(518) 863-6289

Mark S. Breen
RFD #1, Box 72
Concord, VT 05824
Meteorologist monitoring weather events. Working with remineralization in gardening, and would like to apply the same principles to "maple die-back" disease in Vermont and New England.

Anne Caputi
4 Oakwood Terrace
Newton Centre, MA 02159
(617) 244-5227
Holistic health educator. Available to speak on SR, our food supply, etc. Seek opportunities to do educational outreach work. Good public speaking skills.

James E. Carroll
609 Holly Hill Rd.
Johnson City, TN 37604
(615) 282-5779

Deralde Carwile
401 E. 3rd St.
Sweeny, TX 77480
Desire green sand and clodbuster; also coal, lignite, and shale samples to test idea for creating humus and natural gas from composting oil, coal, lignite, and shale.

Sam Catalano, Jr.
594 Innisfall
Queensland, Australia
(070) 644 118
Pacific Mineral Developments Ltd. Interested in producing mineral dust and developing markets.

Steve Chamay
RFD #1
Bennington, VT 05207
(802) 823-5606
Caretaking 200 acres of second growth forest. Looking into mushroom production, wildcraft, medicinal herbs, small fruits, flowers, and flower essences. Selling spring water. Anxious to try out some stone flour. Need help/collaboration.

Gary Clausheide
PO Box 389
Putney, VT 05346
(802) 387-4429
Part-time farmer (organic grains and dry beans) interested in remineralization and starting farmer/consumer cooperatives.

Robert N. Cloughley
RR #3
Newmarket, Ontario
Canada L3Y 4W1
I am retired from IBM and trying to set up a rock dust industry in Canada. I have a 200-acre farm which needs rock dust for rejuvenation.

Dr. Pierre Cloutier, D.C.
10 Bell
Chateauguay, Québec
Canada J6J 3L8
(514) 691-1102
Chiropractor, hygienist, with Earthday organizing public and media viewing of Ephron video, along with sensitization of Hamaker/Weaver thesis on local and national levels. Suggestions and ideas welcome. Looking for local sources of rock dust.

Betsan Coats
"Conch" 8 Kate St.
Alexandra Headland
QLD 4572 Australia

Bertram Cohen
63 Whittier Blvd.
Poughkeepsie, NY 12603
Regular contributor to SR newsletter.

Gary Cohen
350A Crowells Road
Highland Park, NJ 08404
(201) 819-8786
Former research chemist studying literature on climate change. Have been writing analyses on climate issues and sending them to major U.S. environmental groups.

Rod Colbin
2067 Broadway Suite 45
New York, NY 10023
(212) 969-0260

Arne Collen
PO Box 4550
Walnut Creek, CA 94596
(415) 944-1999
Interested in articles to educate the public. Editor of *Journal of World Education*.

Earl Conroy
Waiora Mara Farm
Graham Valley RD 1, Motueka
New Zealand
A healing community of trained naturopaths, chiropractors, midwives, biodynamic agriculturists, biogenic nutritionists, using photon-field radionics for diagnosing human/soil/plant problems and using these energies for healing.

Nick Consoletti c/o Stalling
1825 S.E. Morrison #1
Portland, OR 97214
Learning the art of dialogue (such as Dr. David Boehm); making Bucky Fuller's geoscope, a tool that makes it possible to model earth as a whole.

Robert Dayton
713 W. Ave. I
Temple, TX 76504
(817) 778-4123

Charles de Matas
414 S. Craig St., Suite 114
Pittsburg, PA 15213
(412) 624-1276 or 621-5883
Wish to gain as much knowledge and practical experience while in the U.S. Will eventually return to my native country, Trinidad, to experiment with SR in the tropics.

Andree M. Dewez
2901 S. King Dr., #703
Chicago, Il 60616
(312) 842-1548
Layperson interested in reforesting the planet to its former variety, beauty, and exuberance. I would like to meet others with the same purpose.

W.J. Dieffenbach
R2
Bloomfield, IA 52537
(515) 675-3318
I would like to hear from farmers or others in this area, interested in remin. and regenerative agriculture. Also, looking for stone dust for retail, within 100-mile radius of tri-state area.

Debbie Dise
PO Box 3012 H.S.
Ruidoso, NM 88345
(505) 257-2890

Edward H. Dorn
3 Worcester St.
Taunton, MA 02780

Earth Circle
PO Box 150753
Lakewood, CO 80215
Group dedicated to SR. Sells bumper stickers, "Remineralize the Earth."

Earthday Canada
Peter Petronek, Doug McLean
8800 Yates St.
Victoria, BC
Canada V8W 1L9
Tel. (604) 382-1990
Several major SR projects. See ***SR*** #17

Elizabeth Draper
PO Box 771
Tuxedo, NY 10987
(914) 351-2825
Interested in uses of dowsing and homeopathy and detoxification.

Gary Elder
104 Education Lane
York, SC 29745
(803) 684-0067
I am a ceramic engineer and gardener. My figs flourish with rock dust!

Dr. Harold Elder
World Hunger Crusade, Inc.
PO Box 7006
Miami, FL 33155

Derald Ell
Rte. 2 Box 30
Killdeer, ND 58640
(701) 863-6657

Tom Ellis
1812 26 Ave. S.W. Apt. #19
Calgary, Alberta
Canada T2T 1E1
(403) 228-1571
Looking for others working with rock dust in Alberta or near the Calgary area.

Leon Fadden
PO Box 149005
Orlando, FL 32814-9005
(305) 648-1716
Natural hygienist, computer engineer, financial broker. Would love to talk to people in my area with organic interests.

Wendy Feldman
325 Delgado St.
Santa Fe, NM 87501

Eddie Filer
Route 6, Box 1850G
Naples, FL 33964
(813) 657-6541
I'm a senior citizen living alone on 5 acres, trying to grow as much of my own food as possible. Looking for a source of rock dust in Florida.

C. Finkelstein & Al Lopez
2613 Spencer Rd.
Chevy Chase, MD 20815
(301) 588-6437

Louis Finocchario
7213 W. 60th St.
Overland Park, KA 66202
(913) 362-7439
Am using river silt from Kansas River. Interested in meeting others in the area.

Henry Fleischman
36 Union St.
Guilford, CT 06437
(203) 453-5865
Interested in remineralization research for possible further study and application.

Morley B. Forsyth
Box 129
Reston, Manitoba
Canada ROM 1X0
A grain farmer with increasing interest in rejuvenating soil.

Walter Fridal
130 North 200 East
Tremonton, UT 84337
(801) 257-5667
Farmer willing to experiment.

Vincent G. Gay
Rte 2, PO Box 1350
Starke, FL 32091
I have about 7 acres in natural growth pine. I am retired.

Gold Mine Natural Food Co.
1947 30th Street
San Diego, CA 92102
(619) 234-9711

Brother Alois Goldberger
Regional House Ubbog
Bangued, Abra4
Philippines 2800

Golden Pathways
17 Polaris Dr., North Star
Newark, DE 19711
(302) 239-4567
Health educator, counselor, and therapist, using minerals on a personal basis for healing. Available as speaker on climatic changes and solutions. Plan to distribute rock dust locally.

R.K. Gray
Ngakuru R.D.I.
Rotorua, New Zealand
Tel. 32854
Extensive testing on SR.

Green Ark Cooperative
1058 N. Cactus
Cottonwood, AZ 86326
(602) 634-0158
A new sandblasted ark to collect rock dust.

W.L. Habertier
1504 Galena Apt. #102
Aurora, CO 80010
(303) 343-4560 weekday
(719) 775-9722 weekend
Has anyone ionized rock dust before application and has knowledge of ionization process?

Shirley-Anne Hardy
The Rocks
Pitlochry
Perthshire PH16 5QZ
Scotland

John Hisle
7535 Sebago Rd.
Bethesda, MD 20817
Interested in experimenting with SR in my garden and passing word on to family and friends; and possibly going into the rock dust business in the future.

Arlene Hoffer
15684 Keppen
Allen Park, MI 48101
(313) 386-3741

Robert G. Hoffman
565 Lower Vann Road
Cleveland, TX 77327
(713) 593-1803

Scott Holland
13206 SE 57th St.
Bellevue, WA 98006
(206) 641-4847

Gary R. Huber
Questar Productions
1058 Weld County Rd. 23½
Brighton, CO 80601
(303) 659-4028

Helene Huber
PO Box 43
Salfordville, PA 18958
Co-founder of *Earth Stewards*— a working group taking earth care as a spiritual discipline.

Hugh Huntington
PO Box 2379
Taos, NM 87571
(505) 776-8347

Philip Isely
1480 Hoyt St., Suite 31
Lakewood, CO 80215
(303) 233-3548 or 526-0463
Secretary General, World Constitution and Parliament Association. Interest: to implement World Legislative Bill #6 for the Emergency Earth Rescue Administration (copies available).

Bill and Doris Isely
Imladris Organic Farm
80 Walnut Creek Rd.
Franklin, NC 28734
(704) 369-7590

John Stuart Ivy
14240 SE Orient Dr.
Boring, OR 97009
(503) 668-5620
Working on healing nut orchards in the Pacific Northwest.

Tina James
12812 Bridlepath Rd.
Reisterstown, MD 21136
(301) 252 3333
Active organic gardener, teacher and writer. Also presenting programs about creating a new universe through expanded awareness and earth learning.

Eric Johnson
446 Smith Rd.
Webster, NY 14580
(716) 671-7944
Professional gardener, interested in benefits of remineralizing calcareous soils with rock dust.

W.B. Joyce
7911 Sherwood Ave.
Towson, MD 21204
(301) 337-8010

Ron Kastle
PO Box 61
Rosedale, NY 11422
(718) 528-2870
Wish to correspond w/ other SR enthusiasts to remineralize for morality and profit.

Michael Kolodny
PO Box 772
Micaville, NC 28755
(704) 675-9181
Experimenting on our raised garden beds and hope to do forest/orchard work with rock dust; have local dust source contacts. Presenting the theories and information occasionally as an evening lecture/video/discussion.

Andrew Kozlowski
54 Canadian Ave.
London SE6 3BP
England

Elaine Kraft
3839 Oak Glen Dr.
Santa Rosa, CA 95404
(707) 575-0252

Bernie Kravitz
PO Box 448
Canoga Park, CA 91305

Kathleen Lamont
PO Box 626
Rainier, WA 98576
(206) 446-2418
Want to network with others in the Pacific Northwest.

Harold F. Lane
20 Flesherin Point
Isle of Lewis
Western Isles, PA86 0HE
Scotland
Involved with remineralization on croft land in Lewis for horticulture and forestry. Attempting to get University support in Scotland for research into agrogeology and its application and appropriate funding.

Robert Love
Love Grain Company
Harmony, MN 55939
(507) 937-3445
I'm a large organic farmer and have built a gravel grinder and am looking for funding.

Theo Larson
740 Harvey St.
Englewood, FL 34223

Judith L. Lashley-Roberts
3611 35th St. West
Bradenton, FL 34205

H.C. Leagh
2241B S.E. 172 Terr.
Silver Springs, FL 32688

Alfred W. Ledger
Box 528
Mannford State, OK 74044
(918) 865-4072
Would like to hear from someone in Oklahoma who is interested in SR. Maybe get something started.

The Macrobiotic Center of Louisiana
Wendy de Blanc
4323 Carondelet
New Orleans, LA 70115
(504) 897-5065

Van J. Martin
Native Self-Sufficiency Center
RD #1 Box 375
Cold Brook, NY 13324
Mohawk Indians with an immediate need for information about rock dust sources, SR techniques, rock crushers.

Maryland Home Education Ass.
M. Smith
9085 Flamepool Way
Columbia, MD 21045
(301) 730-0073

Susan Meinke
Products for Nature
23158 Cora
Farmington Hills, MI 48024

Michael Menkes
PO Box 6914
W. Palm Beach, Fl 33405
Super blue-green algae, world's only human food supplement wild-crafted from a remineralized lake. Wholesale prices. We ship everywhere. Girasole Services, above address.

Micro Organic Management Systems
PO Box 1611
Clackamas, OR 97015
Rock dust source ground from old river deposits, 40% 200 mesh or finer. available—50 lb. bags (completely dry) for $3.

Bruce Miller
331 Palmerston Blvd.
Toronto, Ontario
Canada M6G 2N5
(416) 962-4995
Distributor for Harvest rock grinder.

David H. Miller
Dept. of Biology
Kettering 103
Oberlin College
Oberlin, OH 44074
Rock dust research. See *SR* #17 & 18-19.

Jack Miller
611 S. Pennsylvania St.
Denver, CO 8029?
Involved in rock dust research.

Paul J. Miller
201 N. Columbus St.
Crestline, OH 44827

Richard Mitchell
7936 Slepian St.
Harrisburg, PA 17112
(717) 657-8655

Eileen Moore
College of Soil Research
5 Chase Side Place
Enfield, Mddx.
England EN2 6QA
01-363-8615
Set up the College solely to bring SR to the U.K. Selling rock dust and books on SR. Networking information to dietary therapists and growers in U.K., also the media. Importing Superbiomin from Austria to sell. Larry Ephron video, *The End* for hire.

Brian Mowad
1112 Rosa Ave.
Metairie, LA 70005
(504) 838-9189
Thirteen-year-old student experimenting extensively with the effects of different soil supplements—including rock dust—on the growth and productivity of broccoli plants.

Rhoda Mozorosky
7338 Oak Hill Rd.
Roseburg, OR 97470
(503) 459-4700
It would be nice to start a group in Oregon (Douglas County) interested in SR and raising home orchards without pesticides.

W.E. Murnane
PO Box 198
Apollo Bay
Victoria 3233, Australia

George M. Myers
9311 Charleston St.
El Paso, TX 79924
(915) 751-2792

Namasté Greens
Box 578
Barnstead, NH 03225
(603) 776-7776
Ecology commune: 49 acres for ecology/camping/earth healing projects. Have done garden remineralization for 3 years, with phenomenal results. Currently dusting our forests. We seek nature lovers to co-participate.

Naturopathic Resources
PO Box 214
Hamilton, NY 13346
(315) 824-3007

Tom Newkold
3531 Vista Ave. #2
Cincinnati, OH 45208
(513) 321-7316
Member of Midwest Macrobiotic Center providing info and access to alternative lifestyles based on natural organic means.

Jan Nilsson, Moody Hill Farms, Inc.
Box 171
Amenia, NY 12501
(914) 373-8650
Keep us in mind if your looking for compost to mix with rock dust.

Kurt Nilsson
Blue Mt. Quarry
17701 Big Falls Rd.
White Hall, MD 21161
(301) 343-0500
Manufacturer of organic soil mixes, compost, and Earthfood rock dust. We are at your service—call 1-800-634-3002.

Jane Norton
Rte. 1 Box 171 B
Durham, NC 27705

Omar!
1402 E. Skyline Dr.
Madison, WI 53705-1133
(608) 231-3070
Having experienced the physical benefits of remineralizing my body over the past three years, I now seek to support the remineralization of the earth via international networking.

Marc Ostrovsky
383 Harvard St. #106
Cambridge, MA 02138
(617) 864-9579
200-acre farm, heavily wooded, in Warren and W. Brookfield, MA.

Otto
East Wind Community
Tecumseh, MO 65760
(417) 679-4682
Interests include organic agriculture, permaculture, bioregionalism, and the intentional community movement.

Stanley H. Owens
1210 East 11th St.
Duluth, MN 55805
(218) 724-1544

Pacific Rim Minerals
Fred Pankratz
PO Box 60183
Fairbanks, AK 99706
(907) 479-8941

M.C. Pereira
CIDSE-PNH, c/o Indoswin Ltd.
Suite 1102B, 11th Floor
Durit Thani Office Bldg.
946 Rama 4 Road
Bangkok 10500, Thailand
I am an agronomist at the Institute of Agriculture, Fishery, Forestry, Mechanization and Animal Science. There are very few resources here in terms of English books, finance, and plant material. I'm trying to develop a small resource base of books and plant material to start on small scale sustainable systems. I'm looking for plant material and books for Kampuchea; if anyone is interested in helping us, let me know. We have a tropical climate.

Permakultur Institut e.V.
Ginsterweg 5
3074 Sleyerberg, W. Germany
Tel. 01149/5264/1012

Dr. Michael Pimbert
ILRISAT Legumes Program-Andhara
Pradesh-Pakanchern PO 502324, India
Researching remineralization.

Leslie Plaisance
2209 N. First St.
Golden Meadow, LA 70357
(504) 475-6664

M. Pochedly
RD #8
Parklane Dr.
Meadville, PA 16335

Cathy Ravenborg
20563 Cheney Dr.
Topanga, CA 90290

Samuel Ready
32 Camino Del Diablo
Orinda, CA 94563
(415) 253-0756

Richmar Group
PO Box 14956
Albuquerque, NM 87191
(505) 281-8442
New Age survival interested in using new methods for food growing, SR, etc.

George Ripley
Clarepoint
Findhorn, Forres
Morayshire IV36 0YY, Scotland
Tel. 0309-30333

Bruce Rogers
3956 Fuller Ct.
Boulder, CO 80303
(303) 499-2978
Rock dust source—The Boulder Co.

Rolling Knolls Farm
HCROI Box 68A
Leopold, MO 63760

Judy Roylance
Rte. 1, Box 1398, Dogwood St.
Sag Harbor, NY 11963
(516) 725-1009
Distributor of pelletized, gypsiferous shale, a rock dust product. At an application rate of 150 lb. per acre, it is a convenient and economic alternative. I will ship anywhere.

S.A. Rockdust Corporation
PO Box 4167
Pretoria, Repub. of South Africa 0001
Tel. 012-57-5871 or 012-73-9478

Stephanie Sable-Bierman, L. Ac.
2512 Ninth St #17
Berkeley, CA 94710
(415) 658-9649
I am trying to awaken senators and heads of states in various countries to the imminent global weather crisis and provide viable solutions. I need good color photos of the effect of rock dust on garden produce compared with controls.

Sharon Joy Sands
5217 Tucson Circle
Fair Oaks, CA 95628
(916) 962-2683
I am a macrobiotic, amateur gardener, registered nurse, certified massage technician, certified infant massage instructor, concerned mom and wife.

Frederick I. Scott, Jr.
6925 Dogwood Rd.
Baltimore, MD 21207
(301) 298-5716
Interested in measured evaluations of remineralization tests.

Peter Seiler/Marilyn Neuhauser
Peaceful Alternatives
209 Guilford College Rd.
Greensboro, NC 27409
(919) 294-0477
Holistic health. Peter is an iridologist, Marilyn a grad. nutritionist. Organic produce and color healing slides, iridology camera, electronic oscillator, and natural supplements.

B. Shadden
RR1, Barss/Cr
Nova Scotia, B0R 1A0, Canada
I am interested in others in Nova Scotia interested in soil remineralization.

Barry Slogrove
Eco-Australia
M.S. 591
6 Beenham Valley Rd.
Wolvi via Gympie
QLD 4570 Australia

Charlotte L. Suhr
4702 E. Mariposa St.
Phoenix, AZ 85018

Bob Sniadach
Box 3582
Boynton Beach, FL 33424-3582
(305) 736-6709
All South and Central Florida persons interested in acquiring gravel dust (any quantity) may contact me so we can pool our resources. I will organize large quantity shipments by rail to our area.

Donald J. Supkow
28 Sefton Cir.
Piscataway, NJ 08859
(201) 752-3189
Hydrologist and source of rock dust.

Ekhart Stoyke
Restorative Eco Agri Project Society
Box 30, Site 4 RR1
St. Albert, Alberta
Canada T8N 1M8
Researching rock dust.

Charlotte L. Suhr
4702 E. Maripose St.

William H. Taylor
1718 Gascony Rd
Leucadia, CA 92024
(619) 436-7900
Having a 30-year experience with the efficacy of trace minerals from sea water, I am most aware of this lack in the soils and the food chain.

Pete Thack
4439 Byron Rd.
Howell, MI 48843
(517) 546-5404

Dominick Trombetto
1525 Davis Rd.
Woodruff, SC 29388

B.J. Tudja
Apartado Postal 445
Pátzcuaro, Michoacan
Mexico
I am a retired dairy farmer from upstate New York working in Mexico on projects involving SR, introducing multi-purpose leguminous trees, reforestation. Am using some of Fukuoka's methods in pelleting seeds and inter-planting. Since I am starting trees from seeds, I have no results yet to report.

Uprichard Family
RR#2, Box 163
Colrain, MA 01340
(413) 337-8570
We are actively networking SR dust as we have advocated remineralization of people through the marcrobiotic way of thinking, eating, and living.

Gary A. Via
RR 1, Box 305
Quinton, VA 23141
My family of 4 lives on a 90-acre farm (20 acres open) with a large organic garden, small fruit orchard, and aspirations of starting a small livestock operation.

Matt Vooro
2260 Britannia Rd., RR #3
Campbellville, Ontario
Canada L0P 1BD

Debra C. Vuckovich
Society for an Extended Ethic
1139 Woodside Trail
Troy, MI 48098
(313) 828-4179
Key networker in Remineralization Network and animal rights.

Susan Walker-Meere
P.O. Box 582
Newbury, OH 44065
(216) 564 9467
Artist, small certified organic farm in NE. Ohio Member DEFFA.

Mauricio Waroquiers
Centro Macrobiotico de Maldonado
Sarandi 672, Maldonado
C.P. 20000, Uruguay
Tel. 2 18 84

Roger Wentling
PO Box 543
Saylorsburg, PA 18353
(215) 381-3208
I am a civilian agronomist for the US Army and would like to encourage remineralization on US Army bases as an experiment. I also write a monthly column for "The Stockman Grass Farmer" on innovative grass farmers using non-chemical input grazing management.

Joy Wilton-Hill
"Aberfoyle" via Armidale
Australia NSW 2350

Glenn Wiprud
12702-15 Ave. N.E., Apt #208
Seattle, WA 98127
(206) 365-0904
Interested in starting a cooperative.

Fred B. Wood, Sr.
2346 Lansford Ave.
San Jose, CA 95125
(408) 723-7818
Member of Earth Regeneration Society, Earth Regeneration Corporation, and Computer Social Impact Research Institute.

Fred Wood
2318 N. Trenton St.
Arlington, VA 22207

Eldon G. Worsley
Rte. #3 705 N. 39th Rd.
Mendota, IL 61342
Farmer interested in talking with others who have experience with the remineralization process.

Diana Young
61C Carmelita St.
San Francisco, CA 94117

Bob Carter, Terra Consulting Inc.
2739 W Canmore Rd NW
Calgary, Alberta, Canada T2M 4J6
(403) 245-4131
Soil scientist wants to exchange info.

Rob Gould, Oregon Organic Supply Inc.
255 Richmond St. SE
Salem, OR 97301
(503) 363-1352
Supplier of Organic Fertilizer, feed mill. Working to develop rock dust.

Resources

Remineralize the Earth is available in larger quantities inexpensively for conferences and discounted for sale in bookstores and health food stores. Please contact us for prices. Some past issues are available for $4.00. Ask about our ad rates.

SR Research Packet

Remineralize the Earth offers a Research Packet on remineralization research around the world including Germany, Austria, and Australia for forests, agriculture and orchards. Updated to include studies by Peter Von Fragstein at the University of Kessel, Germany and Ward Chesworth at the University of Guelph, Ontario and Dennis Eberl and Tung Ming Lai at Colorado State University. Send $10.00 within the U.S. and Canada and $15.00 outside North America to: *Remineralize the Earth*, 152 South Street, Northampton, MA 01060.

Hamaker WeaverPublishers

Order the book *The Survival of Civilization* ($12.00 ppd.) *The Solar or Ice Age? Bulletin #10* (366 pg.) Suggested minimum donation $10.00. CA residents add state tax. Hamaker Weaver Publishers, P.O. Box 1961, Burlingame, CA 94010. Tel (415) 347-9693.

People For A Future

To order the video *Stopping The Coming Ice Age*. ($32.95 ppd). CA residents add People For a Future, 2140 Shattuck Ave., Berkeley, CA 94704, Dial 1-800-441-7707 or (415) 524-2700 in California.

Earth Regeneration Society

ERS is an active and effectively organized network dealing with the climate crisis, particularly with stimulating and coordinating initiatives in scientific research and both governmental and non-governmental policy. They have available numerous scientific papers on climate and are dedicated to the implementation of an earth regeneration program.
President, Alden Bryant w/ Fred Bernard Wood, PhD. and others.
Earth Regeneration Society
1442A Walnut St. #57, Berkeley, CA 94709.

Bread From Stones, Dr. Julius Hensel. Health Research, Box 70, Mokelumne Hill, CA 95245. $6 ppd. Writings from the 1890's on stone flour for agriculture, recently compiled, translated and in a typed manuscript.

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- A Call For Action
- N-VIRO-Remineralized Soil Out of Sewage Sludge
- Stone Age Agriculture
- Shaping Your Own Experiments With SR